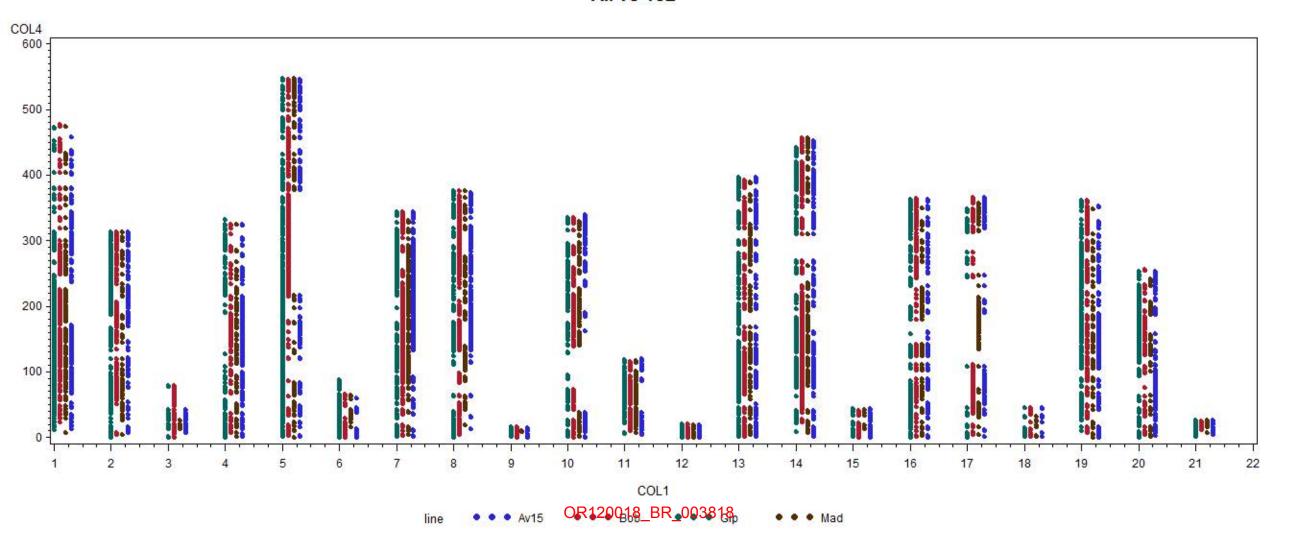
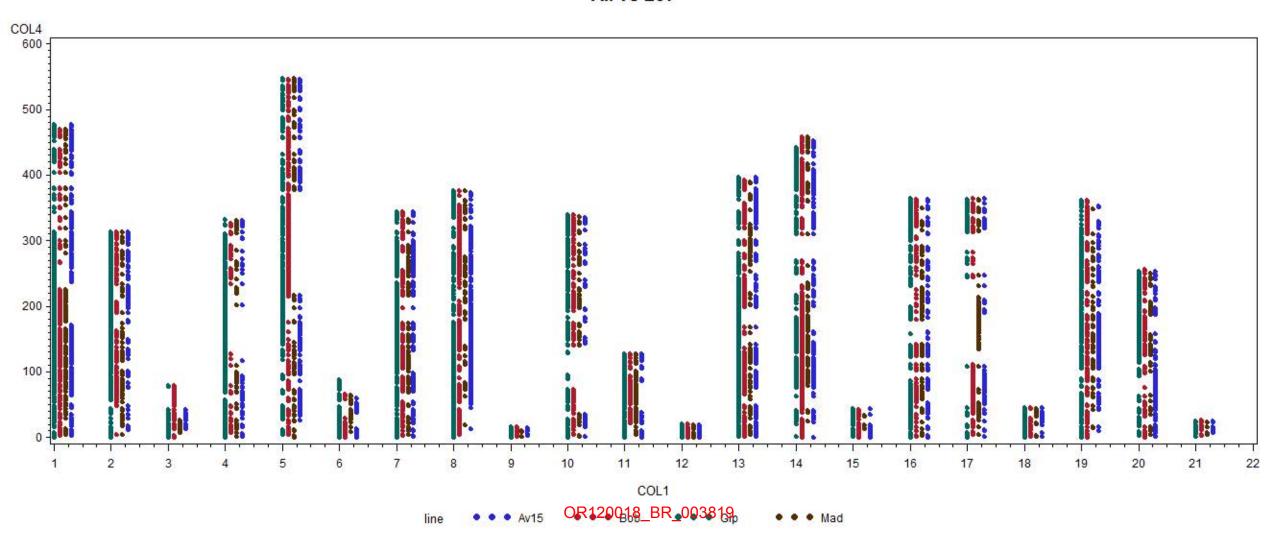
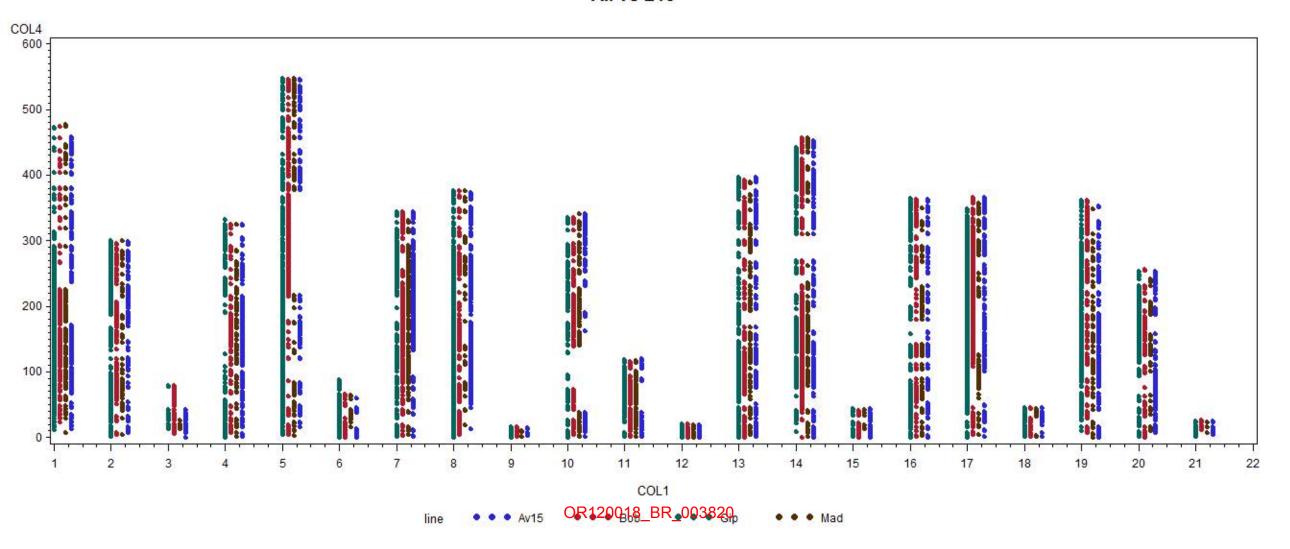
All vs 182



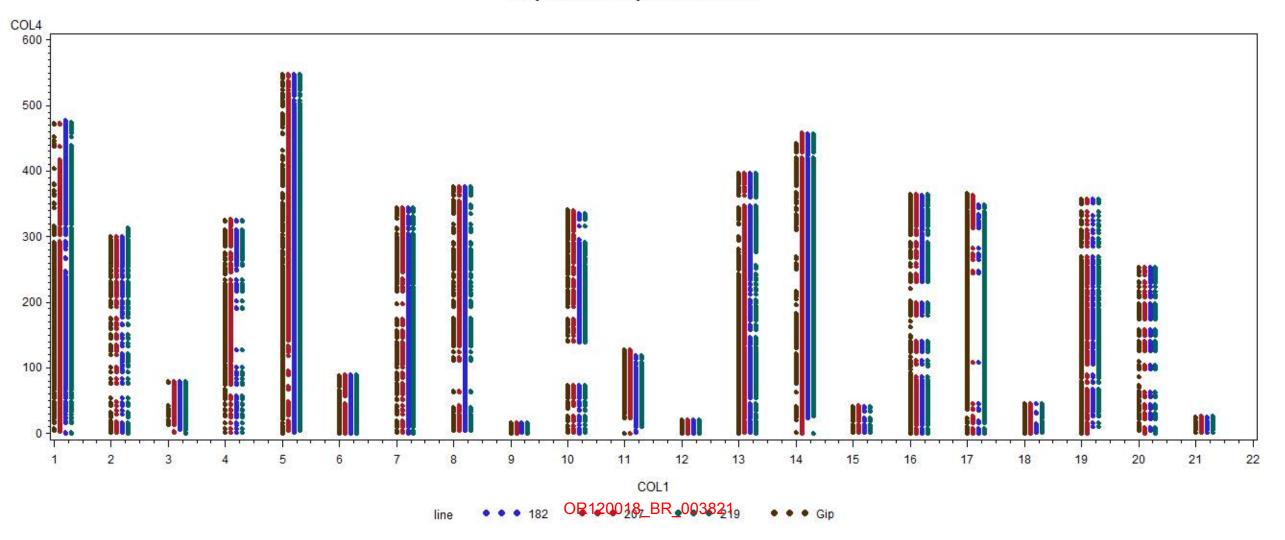
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All vs 219



Express vs Gip 207 182 219



Expresso Hard Red Spring Wheat

B. Origin and breeding of the variety.

'Expresso' originated from a backcross breeding scheme with the objective of moving stripe rust resistant genes YR15 and YR17 into 'Express' background. The donor of YR15 was the isogenic line of YR15 in 'Avocet' provided by Bob McIntosh. The donor of LR37/SR38/YR17 was the variety Madsen. The genes were introduced separately into Express using 6 backcrosses with Express as the recurrent parent and using molecular markers for selection. The two resulting lines were crossed and the double homozygote line that become 'Expresso' was selected using molecular markers. The pedigree is Express 6*/YR15 Avocet//Express 6*/Madsen. The crossing and marker assisted selection were performed in the green house by Dr. Jorge Dubcovsky of the University of California Davis. In the F3 generation of the final cross, four plants were found to be homozygous for YR15 and LR37/SR38/YR17. The seed of these four plants were planted in a growth chamber near Bozeman, MT in September of 2004. Seed was harvested from 132 plants in December and planted as plant plots near Yuma, AZ in December of 2004. One hundred twenty plant plots that were identical and uniform were harvested and bulked together and designated DA984-034SRR. This seed was used to plant 6 acres of Breeder Seed near Bozeman, MT in the summer of 2005. The resulting seed was used to produce Foundation Seed near Woodland, CA in 2006.

'Expresso' has a tall variant that is 12 cm to 30 cm taller that occurs at a frequency of up to .5%. A white seed variant occurs at a frequency of up to .5%. An awnless variant occurs at a frequency of up to .5%.

'Expresso' has been observed for three generations of reproduction and seed increase and is stable and uniform.

C. Botanical description of the variety

'Expresso' is day length insensitive hard red spring wheat. "Expresso' is a semidwarf variety with good straw strength and medium maturity. 'Expresso' has white colored chaff, long awned heads that are strap shape. The glumes are long, wide with oblique shoulders. Plant color at booting is blue green and the flag leaf is erect and twisted. Hairs are present on both the last rachis internode and the auricles.

'Expresso' most resembles the variety the hard red spring variety 'Express' but differs in that 'Expresso' has the molecular markers for YR15 and LR37/SR38/YR17 while 'Express' does not have the markers.

Please see an attached completed copy of an Objective Description of Variety – Wheat.

Expresso Hard Red Spring Wheat

D. Evidence to support identity of variety

MEAN AGRONOMIC DATA OF 'EXPRESSO' IN THE 2006 UC REGIONAL COMMON WHEAT AND TRITICALE TEST

OO RESIDING WILL AND TRITIONE LEGI												
	AT SITES WITH HIGH STRIPE RUST INFESTATION. (UC DAVIS, SACRAMENTO/SAN JOAQUIN DELTA, AND MADERA)											
VARIETY	YIELD LBS/A	PLANT HEIGHT INCHES	LODGING RATING	DAYS TO HEAD AFTER 3/1	TEST WEIGHT LBS /BU	STRIPE RUST RATING						
EXPRESSO	5997	43	2.2	51	62.2	1.3						
EXPRESS	4190	43	2.8	50	53.9	6.6						
SUMMIT	4390	38	1.1	50	55.0	6.9						

	% PROTEIN	SDS SED			
EXPRESSO	4978	41	62.0 1.0	12.0	104
EXPRESS	3179	40	57.1 5.5	12.6	107
SUMMIT	2253	35	51.5 8.0	14.0	118

MEAN AGRONOMIC DATA OF 'EXPRESSO' IN 2006 WESTBRED LLC TRIALS IN THE ABSENCE OF HIGH LEVELS OF STRIPE RUST (YUMA, AZ; CORCORAN, CA; FIVE POINTS, CA; DIXON, CA)										
EXPRESSO	5560	39	42	62.0	14.9	111				
EXPRESS	5658	39	42	61.4	14.5	109				
SUMMIT	5405	35	43	60.1	13.9	114				

Rating scale for stripe rust and lodging: 1 = 0-3%, 2 = 4-14%, 3 = 15-29%, 4 = 30-49% 5 = 50-69%, 6 = 70-84%, 7 = 85-95%, 8 = 96-100%

E. Area of adaptation and primary use of the variety

'Expresso' is adapted to the same areas of production as the variety 'Express'. This includes the central valleys of California as well as the irrigated areas in Washington, Idaho and Montana. The primary use of 'Expresso' will be for general purpose bread flour.

Expresso Hard Red Spring Wheat

F. Maintaining Seed Stock classes

Westbred, LLC will maintain breeder seed by planting spike rows as needed. The certified classes of seed will be Foundation, Registered and Certified. Foundation seed will be produced from foundation seed stocks as long as certification standards are maintained.

J. Information to assist Field and Seed Inspectors

'Expresso' is day length insensitive hard red spring wheat. "Expresso' is a semidwarf variety with good straw strength and medium maturity. 'Expresso' has white colored chaff, long awned heads that are strap shape. The glumes are long, wide with oblique shoulders. Plant color at booting is blue green and the flag leaf is erect and twisted. Hairs are present on both the last rachis internode and the auricles. 'Expresso' has a tall variant that is 12-30 cms taller that occurs at a frequency of up to .5%. A white seed variant occurs at a frequency of up to .5%. An awnless variant occurs at a frequency of up to .5%.

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7/29/2013 plata, patwin, wb rock DNA quantification 7/29/2013 DNA from plants in gr DNA quantification	7/26/2013	tissue from plants in §	DNA extraction	
7/29/2013 DNA from plants in gr DNA quantification				
• • •	7/29/2013	DNA from plants in gr	DNA quantification	
7/31/2013 DIVA HOLLI PIGHES III BIT CIV 313	7/31/2013	DNA from plants in gr	PCR	STS

7/24/2012 DNA (ata in a BCD	CCD
7/31/2013 DNA from plan	-	SSR
8/1/2013 Patwin,plata,\		SSR
8/2/2013 Patwin,plata,\		SSR
8/5/2013 Expresso red,	express harvest tissue	
8/5/2013 Event specific	PCR on PCR	STS
8/6/2013 APHIS DNA	PCR	SSR
8/6/2013 plata,patwin,v	wb rock PCR	SSR
8/7/2013 Market class	PCR	SSR
8/8/2013 APHIS DNA	PCR	SSR
8/8/2013 GIPSA sample	s-Expre: DNA extraction	
8/9/2013 Market class	PCR	SSR
8/9/2013 APHIS DNA an	nd Mark PCR	SSR
8/12/2013 APHIS DNA an	nd Mark PCR	SSR
8/13/2013 DNA for APHIS	S,GIPSA DNA quantification	
8/13/2013 APHIS DNA(re	•	SSR
8/14/2013 APHIS DNA (re	•	STS
8/14/2013 APHIS DNA	PCR-Flourescence	SNP
8/16/2013 GIPSA sample		SSR
8/19/2013 APHIS DNA	PCR	STS
8/20/2013 APHIS DNA	PCR	STS
8/20/2013 APHIS DNA	PCR	SSR
8/21/2013 GIPSA sample.		SSR
8/22/2013 GIPSA sample.	•	SSR
8/22/2013 APHIS DNA	PCR-Flourescence	SNP
8/22/2013 Market class	PCR	SSR
8/26/2013 APHIS DNA	PCR	STS
8/26/2013 GIPSA sample.	-	SSR
8/27/2013 Market class	PCR-Flourescence	SNP
8/27/2013 Market class 8/27/2013 GIPSA sample.		SSR
·	s-Expre: PCR-Flourescence	SNP
8/28/2013 APHIS DNA	•	SSR
8/30/2013 GIPSA sample	·	SSR
9/3/2013 APHIS DNA	PCR	STS
9/3/2013 Market class	PCR	SSR
9/4/2013 GIPSA sample	•	SSR
9/5/2013 APHIS DNA an		SSR
9/6/2013 Market class	PCR	SSR
9/6/2013 Eltan,Express,		SSR
9/9/2013 APHIS DNA	PCR	STS
9/9/2013 APHIS DNA	PCR	STS
9/10/2013 APHIS DNA an		SSR
9/11/2013 Solano red, so		
9/11/2013 APHIS DNA, W		SSR
9/12/2013 APHIS DNA an		SSR
9/12/2013 GIPSA sample	·	STS
9/12/2013 Market class	PCR	SSR
9/16/2013 APHIS DNA wi	ith ExprePCR	STS

	9/23/2013	APHIS DNA, GIPSA san DNA dilution	
	9/24/2013	Market class and Expi PCR	STS
	9/24/2013	Avocet, Express, Mad harvest tissue	
	9/24/2013	APHIS DNA, Expresso PCR	SSR
	9/26/2013	APHIS DNA, Market c PCR	STS
	9/26/2013	APHIS DNA PCR	STS
	9/27/2013	Avocet, Express, Mad DNA quantification	
	9/30/2013	Avocet, Express, Mad PCR	STS
	9/30/2013	APHIS DNA, Market c PCR	STS
1	10/23/2013	APHIS DNA, GIPSA samples and controls	

11/13/2013 APHIS Plants

marker result

50 SNP markers

50 SNP markers scored wmc720,barc356,mwc671,barc343,gwm513,umn25 scored

36 SNP

36 SNP scored Ppd-D1a scored pinB-D1 (BsrBI) scored

umn25,wmc671,wmc11,gwm583,gwm636,barc127

umn25,wmc671,wmc11,gwm583,gwm636,barc127 scored

barc71,barc96,barc130,barc133,barc141,barc143,barc148,barc283

primer plate 4 scored primer plate 2 scored primer plate 7 scored

wmc720,barc356,mwc671,barc343,umn25,umn26,Ppd-D1a,gwm636 wmc720,barc356,mwc671,barc343,umn25,umn26,Fscored

cfd30,wmc128,wmc134scoredVentriupscoredPinbfailedPinA-D1scoredVrn1A,Vrn1B,Vrn1DscoredPinbfailed

VrnB scored

sq0019,sq00194,sq0039,sq0040 scored

wms413,cfd59,wmc128,barc49,gdm99,barc83,gwm scored
barc49,gwm400 scored
barc343,wmc128,gdm127 scored
sq0019,sq00194,sq0039,sq0040 scored
barc0076,wms413,barc0358,cfd059,cfd053,wmc419 scored
wms413,cfd59,wmc419 scored
barc76,wms413,barc358,cfd59,cfd53,wmc419 scored
barc184,gwm52,barc222,gwm111,gdm33,gwm155 scored
barc184,gwm52,barc222,gwm111,gdm33,gwm155 scored
gwm601,wmc59,wmc11 scored
gwm570,gwm325,gwm537 scored
wms413,barc83,barc49,barc222,gwm52,gdm99,bar scored
sq0019,sq00194,sq0039,sq0040 scored
custom made for seed coat color scored
barc76,wms413,barc358,cfd59,barc184,gwm52,barcscored
pinB-D1 (BsrBI), PinA-scoredD
RhtB1a,RhtB1b,RhtD1a,RhtD1b scored
wmc169,wmc332,wmc25,wmc428,wmc533,wmc36 scored
gwm52,gwm601 scored
barc184,wmc419,barc148 scored
RhtB,RhtD scored
wmc169,wmc332,wmc25,wmc428,wmc533,wmc36 scored
A-null,Pina-D1 scored
wmc169,wmc332,wmc25,wmc428,wmc533,wmc36 scored
RhtB,RhtD scored
gwm325,gwm537,gwm130,wmc416,gwm400,wmc1scored
RhtB,RhtD scored
gwm609,gwm624,barc127,barc71,barc356,gwm413 scored
gwm609,gwm624,barc127,barc71,barc356,gwm413 scored
Ventriup-LN2 scored
barc83,gdm127,gwm400,wmc128,barc49,gdm99 scored
barc184,gdm127,gwm130,wmc416 scored
gwm636,gwm614,scm9,gdm67,wmc278,barc174,gv scored
gwm636,barc174,gwm614,scm9,gdm67,wmc278 scored
barc49,barc76,barc83,barc184,barc222,barc356,gdr scored
Pina-D1 scored
Ventriup-Ln2 scored
barc148,gwm130,gwm400,barc148,wmc416,wmc14 scored
Ppd-D1a scored
wmc559,cfd48,cfd79 scored
sq0019,sq00194,sq0039,sq0040 scored
wmc559,cfd48,cfd79 scored
Ventriup-Ln2 scored

A-null	scored
Ppd-D1a PinA-D1 A-null	scored scored scored
sq0019,sq00194,sq0039,sq0040 Pinb-D1	scored scored

notes

frozen DNA samples arrived in lab; 50 samples ~100ul DNA samples ranged from 15ng/ul to 774ng/ul

SNP markers showed confusing results; a lot of differences between individual samples, not typical of off-type var see attached excel file APHIS / AMS SSR analysis

SNP markers showed confusing results; a lot of differences between individual samples, not typical of off-type var see attached excel file APHIS / AMS SSR analysis see attached excel file APHIS / AMS SSR analysis

48 potted plants and \sim 100 leaf tissue samples arrived, potted plants stored in locked growth facility, leaf tissue st tissue was in very poor condition, DNA extraction of a small subset was done to test if DNA was still viable DNA from previous extration worked, yields were highly variable based upon green leaf tissue amount

samples ranged from 11ng/ul to 615ng/ul

umn25 and wmc671 were repeated on AMS DNA to validate that the samples were the same as the previous APH see attached excel file APHIS / AMS SSR analysis

primer plates = 96 different SSR primer pairs; used to determine polymorphic markers between individuals primer plates = 96 different SSR primer pairs; used to determine polymorphic markers between individuals primer plates = 96 different SSR primer pairs; used to determine polymorphic markers between individuals Can start including Bobwhite into the analysis

identification of polymorphic markers for futher analysis

test for polymorphic markers against express, expresso, bobwhite and solano

see attached excel file APHIS / AMS SSR analysis

unclear results from Vrn markers; ie can not determine winter or spring habitat from the molecular profile planted 96 well flats of cultivars, used in identifying cultivar profile and finding off-type samples within cultivars

planted 96 well flate

seeds from field grown samples were planted; 1 seed from each spike, all other seed were sent to GIPSA 480 samples collected, lyophilization, growned

tissue collected, used fir DNA extraction through process of lyophilization, grinding tissue, DNA extraction unclear results from Vrn markers; ie can not determine winter or spring habitat from the molecular profile 480 samples extracted

DNA concentration was measured

~150 samples extracted

DNA concentration was measured

DNA concentration was measured

Mon71800 event specific PCR primers, NEB TAQ; see attached excel file APHIS / BR samples

see attached excel file APHIS / BR samples
Mon71800 event specific PCR primers, Red TAQ; see attached excel file APHIS / BR samples
~90 samples extracted
DNA concentration was measured
Mon71800 event specific PCR primers, NEB TAQ; see attached excel file APHIS / BR samples To differentiate red and white seed coat
Using hotstart PCR

Sample plate prepared for 90K SNP

seeds derived from APHIS investigation,

~288 samples were quantified Mon71800 event specific PCR primers, NEB TAQ; see attached excel file APHIS / BR samples

90K SNP data received

Plants that did not form spike kept at 4°C for vernalization

ieties found in field studies.
ieties found in field studies.
ored in locked -80C frezer
IS samples: see attached excel file APHIS / AMS SSR analysis

Sort 96 we	e Sample na	WMC; WMC	BARC:	BARC: \	WMC '	WMC'	WMC	BARC:	BARC:	Gwm!	Gwm! Gwi	n! Gwm! Umn2
1 A01	1C	134	172							169	219	301
2 A05	33C	149	164		134	136	164	139	167	169		301
3 B01	2C	134	172		136	148		139	151	169	219	301
4 B04	26C	149	164		136			139	167	169		301
5 B05	34C	149	164		136			139	167	169	219	301
6 B06	42C	134	164		136	164		139	167	169		301
7 C01	3C	134	172		136	148		139	151	169	219	301
8 C04	27C	149	164							169	219	301
9 C05	35C	149	164		136	164		139	167	169		301
10 C06	43C	134	164		136	164		139	167	169		301
11 D01	4C	134	172		136	148		139	151	169	219	301
12 D02	12C	149	164		136	164		139	167	163	169	320
13 D03	20C									169		301
14 D04	28C	149	164							169		301
15 D05	36C	149	164					139	167			
16 E01	5C	134	172		136	148		139	151	169	219	301
17 E02	13C	149	164		172			175		169		320
18 E03	21C									169		301
19 E04	29C	149	164		136	164		139	167	169	219	301
20 E05	37C	149										
21 E06	45C	134	164		136	164		139	167			
22 F01	6C	134	172		136	148		139	151	169		301
23 F02	14C	149	174		136	164		139	167			
24 F03	22C									169	219	301
25 F04	30C	149	164							169	219	301
26 F06	46C	134	164		136	164		139	167	169		301
27 G02	15C	149	164					167		169	219	320
28 G03	23C									169	219	301
29 H02	16C	149	164		136	164		139	167	163		320
30 H05	40C	149	164		136	164		139	167	169		301
31 A02	9C	146	179					173		168	219	301
32 A03	17C		171					173		169		
33 A04	25C	149	168		163			166		163		320
34 A06	41C									169		301
35 A07	49C	149								163		320
36 B02	10C											301
37 B03	18C	146	179					173		169		
38 C02	11C	146	179					173		169	219	301
39 C03	19C	424	4-0		400	4.40		400	454	460		20.5
40 C07	50C	134	172	470	136	148		139	151	169		301
41 D06	44C	146	171	179						169		204
42 F05	38C	146	470		4.4.0			440		169	240	301
43 G01	7C	149	172		146			149		169	219	301
44 G04	31C	1.16								1.00		204
45 G05	39C	146	170							169		301
46 G06	47C	146	179							169		301

47 H01	8C	146		171						169					
48 H03	24C														
49 H04	32C	146		179						169				301	
50 H06	48C													320	
51 A08	AP 700C1	149		162	172		1	L75		169	219			320	
52 A09	HANK	120	165	159	161		1	L64		165	214			301	
53 A10	NICK	134		172	136	148	1	L39	151	165	169	214	219	320	
54 A11	WPB 528	146		179	173		1	L75		169	219			301	
55 A12	H2O														
56 B07	H2O														
57 B08	BABE	120		171	164		1	L67		163	214			301	
58 B09	JEDD	165		159	164		1	L67		165	214			301	
59 B10	NORWEST	149		174	148		1	l51		169	219			301	
60 B11	WPB 926	165		159	164		1	L67		214				301	
61 B12	H2O														
62 C08	BOUNDAR	136		171	148		1	l51		163	211			301	
63 C09	JEFFERSON	165		159	164		1	L67		165				301	
64 C10	ORCF 101	149		168			1	L49		169	219			320	
65 C11	WPB 936	120		159	161		1	L64		165	214			301	
66 C12	H2O														
67 D07	H2O														
68 D08	BRUNDAG	136		171	146		1	L49		169	219			320	
69 D09	KELSE	160		162	152		1	L55		169	219			301	
70 D10	ORCF 102	149		162	146	164	1	L49	167	169	219			320	
71 D11	XERPHA	149		171	161		1	L66		169	219			320	
72 D12	H2O														
73 E07	H2O														
74 E08	CODA	136		168	146		1	L49		169	219			320	
75 E09	VOLT	156		168	172		1	L75		169	219			301	
76 E10	ROD	149		171	146		1	L49		169	219			320	
77 E11	H2O														
78 E12	H2O														
79 F07	H2O														
80 F08	EDDY	160		171			1	L55		163	211			301	
81 F09	LAMBERT	134		166	134	164		L37	167	169	219			320	
82 F10	STEPHENS	134		166	146		1	L49		169	219			320	
83 F11	H2O														
84 F12	H2O														
85 G07	H2O														
86 G08	EXPRESSO	149		164	136	164		L39	167	169	219			301	
87 G09	LOUISE	134		179	148			L51		165	214			301	
88 G10	SOLANO	149		179	136	164	1	L39	167	169	219			301	
89 G11	H2O														
90 G12	H2O														
91 H07	H2O														
92 H08	GOETZE	136		157			1	L75		165	214			320	
93 H09	MADSEN	149		162						169	219			320	

94 H10 TUBBS 06 149 164 171 172 175 320

95 H11 H2O 96 H12 H2O

Umn2Ur	nn2 Umn2 Ppd	-C AMS	gwm6 AMS	[barc1	barc1 AMS	Barc1 AM	S [Barc1	Barc1 AMS	[Barc1	Barc1 AMS [
4	118 30	7 A01	130 A01	219	A01	298 A01	134	A01	288	A01
		A05	130 A05	226	A05	298 A05		A05	288	A05
4	118 30	7 B01	130 B01	219	B01	298 B01		B01	288	B01
•	0	B04	130 B04	219	B04	298 B04		B04	288	B04
		B05	130 B05	226	B05	298 B05		B05	288	B05
		B06	130 B06	219	B06	B06		B06	200	B06
1	118 30	7 CO1	130 CO1	219	C01	298 C01		C01	288	C01
		7 CO4	130 C01	219	C04	298 C04		C04	288	C04
7	, 10 30	C05	130 C04	226	C05	298 C05		C05	288	C05
	30	7 C06	130 C05	219	C06	301 C06		C06	288	C06
/		7 D01	D01	219	D01	298 D01		D01	288	D01
	136	D01	124 D02	219	D01	301 D02		D01	288	D01
4		7 D03		226		298 D03			288	D02
			130 D03		D03			D03		
	30	7 D04	130 D04	219	D04	298 D04		D04	288	D04
,	110 20	D05	130 D05	219	D05	298 D05		D05	288	D05
		7 E01	130 E01	219	E01	298 E01		E01	288	E01
4	136	E02	124 E02	219	E02	301 E02		E02	288	E02
,		7 E03	130 E03	226	E03	298 E03		E03	288	E03
4	118 30	7 E04	130 E04	219	E04	298 E04		E04	288	E04
		E05	E05		E05	E05		E05	288	E05
		E06	130 E06	219	E06	301 E06		E06	288	E06
4	118 30	7 F01	130 F01	219	F01	298 F01		F01	288	F01
		F02	124 F02	223	F02	301 F02		F02	288	F02
		7 F03	130 F03	226	F03	298 F03		F03	288	F03
4	118 30	7 F04	130 F04	219	F04	298 F04		F04	288	F04
		F06	130 F06	219	F06	F06		F06	288	F06
		G02	124 G02	219	G02	298 G02		G02	288	G02
		7 G03	130 G03	219	G03	298 G03		G03	288	G03
4	136	H02	124 H02	223	H02	301 H02	2 134	137 H02	273	288 H02
		H05	130 H05	226	H05	298 H05	134	H05	288	H05
4	118	A02	120 A02	221	A02	298 A02	2 141	A02	296	A02
		A03	120 A03	221	A03	298 A03	141	A03	296	A03
		A04	122 A04	221	A04	298 A04	141	A04	273	A04
		A06	120 A06	221	A06	298 A06	j .	A06	296	A06
		A07	124 A07	221	A07	298 A07	147	A07	288	A07
		B02	B02		B02	B02	<u>.</u>	B02		B02
		B03	120 B03	221	B03	298 B03	141	B03	296	B03
4	118	C02	120 CO2	221	C02	298 CO2	141	C02	296	C02
		C03	C03		C03	C03	}	C03		C03
		C07	C07		C07	C07	,	C07		C07
	30	7 D06	D06		D06	D06	5	D06		D06
4	118 44	2 F05	120 F05	221	F05	F05		F05	296	F05
320		G01	122 G01	223	G01	298 G01	141	G01	273	296 G01
		G04	G04		G04	G04	1	G04		G04
320	44	2 G05	120 G05	221	G05	298 G05	5 141	G05	273	296 G05
	44	2 G06	G06	221	G06	G06	5	G06	296	G06

	1104	120 1101	224	1104	200 1104	4.44	1104	200	206 1104
	H01	120 H01	221	H01	298 H01	141	H01	288	296 H01
	307 H03 442 H04	H03 120 H04	221	H03 H04	298 H03 H04	141	H03 H04	273 296	H03 H04
	442 H04 H06	120 H04 124 H06	221	H06	298 H06	141	H06	288	H06
436	442 A08	124 H00	223	A08	298 A08	147	A08	273	A08
418	307 A09	128 A09	228	A09	A09	141	A09	288	A09
436	307 A03	130 A10	219	A10	301 A10	134	A10	288	A10
418	442 A11	A11	213	A11	298 A11	141	A11	296	A10
110	A12	A12		A12	A12		A12	230	A12
	B07	B07		B07	B07		B07		B07
418	307 B08	130 B08	219	B08	301 B08	141	B08	273	B08
418	307 B09	128 B09	228	B09	B09		B09	288	B09
418	442 B10	120 B10	226	B10	298 B10	141	B10	288	B10
418	307 B11	128 B11	228	B11	298 B11		B11	288	B11
	B12	B12		B12	B12		B12		B12
	442 C08	C08	221	C08	298 C08		C08	273	C08
418	307 C09	C09	228	C09	298 C09	141	C09	290	C09
436	442 C10	130 C10	226	C10	298 C10	141	C10	273	C10
418	307 C11	126 C11	228	C11	298 C11		C11	288	C11
	C12	C12		C12	C12		C12		C12
	D07	D07		D07	D07		D07		D07
436	442 D08	D08	221	D08	298 D08	141	D08	273	D08
418	442 D09	130 D09	228	D09	298 D09		D09	288	D09
436	442 D10	D10	221	D10	298 D10	141	D10	273	D10
436	307 D11	D11	223	D11	298 D11	141	D11	273	D11
	D12	D12		D12	D12		D12		D12
	E07	E07		E07	E07		E07		E07
436	442 E08	E08	226	E08	298 E08	141	E08	288	E08
418	307 E09	E09	221	E09	298 E09	141	E09	273	E09
436	442 E10	E10	223	E10	298 E10	141	E10	273	E10
	E11 E12	E11 E12		E11 E12	E11 E12		E11 E12		E11 E12
	F07	F07		F07	F07		F07		F07
418	442 F08	126 F08	223	F08	298 F08	145	F08	273	F08
436	442 F09	F09	217	226 F09	298 F09	143	F09	273	F09
436	442 F10	F10	226	F10	298 F10	141	F10	273	F10
	F11	F11		F11	F11		F11	_, _	F11
	F12	F12		F12	F12		F12		F12
	G07	G07		G07	G07		G07		G07
418	307 G08	120 G08	226	G08	298 G08	134	G08	288	G08
418	442 G09	G09		G09	301 G09	141	G09	273	G09
418	307 G10	130 G10	219	G10	298 G10	141	G10	288	G10
	G11	G11		G11	G11		G11		G11
	G12	G12		G12	G12		G12		G12
	H07	H07		H07	H07		H07		H07
436	442 H08	H08	230	H08	298 H08		H08	296	H08
436	442 H09	122 H09	223	H09	298 H09	141	H09	273	H09

436	442 H10	122 H10	223	H10	298 H10	141	H10	273	H10
	H11	H11		H11	H11		H11		H11
	H12	H12		H12	H12		H12		H12

barc1-l	barc1 AMS I	Barc7	Barc7 AMS [Barc9	Barc9 AMS [Barc1	Barc1 AMS D	Barc18 E	Barc18 E	Barc18 AMS [I	barc32
252	A01	132	A01		A01	221	A01	172		A01	217
252	A05	132	A05	210	A05	221	A05	191	220	A05	217
252	B01	132	B01		B01	221	B01	172		B01	217
252	B04	132	B04		B04	221	B04	191		B04	217
252	B05	132	B05	210	B05	221	B05	191	220	B05	217
252	B06	124	B06		B06	221	B06	191		B06	217
252	C01	132	C01		C01	221	C01	172		C01	217
	C04		C04		C04		C04			C04	
252	C05	132	C05		C05	221	C05			C05	217
252	C06	124	C06	210	C06	221	C06	191		C06	217
252	D01	132	D01	210	D01	221	D01	172		D01	217
252	D02	132	D02	207	D02	221	D02			D02	217
252	D03	132	D03		D03	221	D03	220		D03	217
252	D04	132	D04	210	D04	221	D04	191	220	D04	217
252	D05	132	D05		D05	221	D05			D05	217
252	E01	132	E01	210	E01	221	E01	172		E01	217
252	E02	124	E02	207	E02	219	E02	172	191	E02	198
252	E03	132	E03	210	E03	221	E03			E03	217
252	E04	132	E04	210	E04	221	E04			E04	217
252	258 E05		E05		E05	221	E05			E05	203
252	E06	124	E06		E06	221	E06	191		E06	217
252	F01	132	F01		F01	217	F01	172	217	F01	217
252	F02	124	F02	240	F02	221	F02	191	220	F02	198
252	F03	132	F03	210	F03	221	F03	191	220	F03	217
252	F04	132	F04	210	F04	221	F04	101	220	F04	247
252	F06	132	F06	207	F06	221	F06	191	220	F06	217
252 252	G02 G03	132 132	G02 G03	207 210	G02 G03	219 221	G02 G03	172 191	191	G02 G03	198 217
252	H02	132	H02	210	H02	221	H02	172	191	H02	217
252	H05	132	H05	210	H05	221	H05	191	191	H05	217
258	A02	124	A02	214	A02	217	221 A02	172	191	A02	203
258	A02	124	A02	214	A02	217	A03	172	191	A02	203
252	A04	124	A04	210	A04	225	A04	174	131	A04	201
258	A06	124	A06	214	A06	217	221 A06	172		A06	203
254	A07	132	A07	214	A07	225	A07	172	193	A07	194
259	B02	102	B02		B02		B02	-, -	133	B02	13.
258	B03	124	B03	214	B03	221	B03			B03	203
258	C02	124	C02		C02	221	C02	172	191	C02	203
	C03		C03		C03		C03			C03	
	C07		C07		C07		C07			C07	
258	D06		D06		D06	217	221 D06			D06	203
258	F05	124	F05		F05	217	F05			F05	203
254	G01	124	G01	210	G01	221	G01	172	191	G01	203
	G04		G04		G04		G04			G04	
252	258 G05	124	G05	210	214 G05	217	225 G05	172	217	G05	203
258	G06	124	G06	214	G06	217	221 G06	217		G06	203

	H01	124	H01	214	H01	217	221 H01	172	191	217 H01	204
252	H03	124	132 H03		H03	221	225 H03	174	191	H03	203
258	H04	124	H04	214	H04	217	H04	172	217	H04	203
254	H06	132	H06	214	H06	225	H06	172	191	H06	194
258	A08	132	A08	207	A08	219	A08	172	191	A08	203
258	A09	132	A09	210	A09	219	A09	193	219	A09	198
252	A10	124	A10	214	A10	219	221 A10	172	191	A10	217
258	A11	124	A11	214	A11	217	A11	172	191	A11	204
	A12		A12		A12		A12			A12	
	B07		B07		B07		B07			B07	
254	B08	136	B08	210	B08	219	B08			B08	220
258	B09	132	B09	210	B09	219	B09			B09	198
256	B10	124	B10	207	B10	221	B10	172	191	B10	196
258	B11	132	B11	210	B11	219	B11	193	219	B11	201
	B12		B12		B12		B12			B12	
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258	C10	124	C10	207	C10	219	C10	219		C10	194
258	C11	132	C11	210	C11	219	C11	219		C11	201
	C12		C12		C12		C12			C12	
	D07		D07		D07		D07			D07	
258	D08	132	D08	214	D08	217	D08			D08	203
254	D09	136	D09	210	D09	219	D09	193	219	D09	198
258	D10	132	D10	207	D10	221	D10			D10	203
252	D11	132	D11	210	D11	225	D11			D11	203
	D12		D12		D12		D12			D12	
	E07		E07		E07		E07			E07	
258	E08	124	E08	207	E08	217	E08			E08	201
256	E09	124	E09	207	E09	219	E09			E09	201
254	E10	124	E10	210	E10	221	E10			E10	203
	E11		E11		E11		E11			E11	217
	E12		E12		E12		E12			E12	
	F07		F07		F07		F07			F07	
252	F08	124	F08	207	F08	219	F08	219		F08	217
254	F09	124	132 F09	207	F09	225	F09	472	404	F09	203
258	F10	124	F10	207	F10	219	F10	172	191	F10	201
	F11		F11		F11		F11			F11	
	F12		F12		F12		F12			F12	
252	G07	422	G07	240	G07	247	G07			G07	204
252	G08	132	G08	210	G08	217	G08			G08	201
252	G09	112	G09	214	G09	214	217 G09			G09	201
252	G10	124	G10	210	G10	217	G10			G10	217
	G11		G11		G11		G11			G11	
	G12		G12		G12		G12			G12	
250	H07	124	H07	240	H07	240	H07	174	240	H07	204
258	H08	124	H08	210	H08	219	H08	174 172	219	H08	201
258	H09	132	H09	207	H09	219	H09	172	191	H09	203

258	H10	124	132 H10	207	H10	219 221 H10	172	191	219 H10	203
	H11		H11		H11	H11			H11	
	H12		H12		H12	H12			H12	

barc32 96 w	wmc128	96 welpinB	96 W	/E Sampl	es A	В	D	Genome	AMS I
A01	231	A01 161	A01	1C	aa	bb	dd	aabbdd	A01
A05	231	A05 161	A05	33C	aa	bb	dd	aabbdd	A05
B01	231	B01 161	B01	2C	aa	bb	dd	aabbdd	B01
B04	231	B04 161	B04	26C	aa	bb	dd	aabbdd	B04
B05	231	B05 161	B05	34C	aa	bb	dd	aabbdd	B05
B06	231	B06 161	B06	42C	aa	bb	dd	aabbdd	B06
C01	231	C01 161	C01	3C	aa	bb	dd	aabbdd	C01
C04		C04 161	C04	27C	aa	BB	dd	aaBBdd	C04
C05	231	C05 161	C05	35C	aa	bb	dd	aabbdd	C05
C06	231	C06	C06	43C	aa	bb	dd	aabbdd	C06
D01	231	D01 161	D01	4C	aa	bb	dd	aabbdd	D01
D02	231	D02 161	D02	12C	aa	ВВ	D	aaBBD-	D02
D03	231	D03	D03	20C	aa	bb	dd	aabbdd	D03
D04		D04 161	D04	28C	aa	bb	dd	aabbdd	D04
D05	231	D05	D05	36C	aa	bb	dd	aabbdd	D05
E01	231	E01 161	E01	5C	aa	bb	dd	aabbdd	E01
E02	231	E02 161	E02	13C	AA	BB	dd	AABBdd	E02
E03	231	E03 161	E03	21C	aa	bb	dd	aabbdd	E03
E04	231	E04 161	E04	29C	aa	bb	dd	aabbdd	E04
217 E05		E05	E05	37C	aa	bb	dd	aabbdd	E05
E06	231	E06	E06	45C	aa	bb	dd	aabbdd	E06
F01	231	F01 161	F01	6C	aa	bb	dd	aabbdd	F01
F02	231	F02 161	F02	14C	AA	BB	dd	AABBdd	F02
F03	231	F03 161	F03	22C	aa	bb	dd	aabbdd	F03
F04		F04 161	F04	30C	aa	bb	dd	aabbdd	F04
F06	231		F06	46C	aa	bb	dd	aabbdd	F06
G02	231	G02 161	G02	15C	aa	BB	dd	aaBBdd	G02
G03	231		G03	23C	aa	bb	dd	aabbdd	G03
H02	231		H02	16C	AA	bb	D	AAbbD-	H02
H05	231		H05	40C	aa	bb	dd	aabbdd	H05
A02	231		A02	9C	aa	bb	dd	aabbdd	A02
A03	231		A03	17C	aa	bb	dd	aabbdd	A03
A04	231		A04	25C	aa	bb	dd	aabbdd	A04
A06		A06	A06	41C	aa	bb	dd	aabbdd	A06
A07	231		A07	49C	aa	bb	dd	aabbdd	A07
B02		B02	B02	10C	aa	BB	dd	aabbdd	B02
B03	231		B03	18C	aa	bb	dd	aabbdd	B03
C02	231		C02	11C	aa	bb	dd	aabbdd	C02
C03		C03	C03	19C	aa	bb	dd	aabbdd	C03
C07		C07	C07	50C	aa	bb	dd	aabbdd	C07
D06		D06	D06	44C	aa	bb	dd	aabbdd	D06
F05	224	F05	F05	38C	aa	bb	dd	aabbdd	F05
G01	231		G01	7C	aa	bb	dd	aabbdd	G01
G04		G04	G04	31C	aa	bb	dd	aabbdd	G04
G05			G05	39C	aa	bb	dd	aabbdd	G05
G06		G06	G06	47C	aa	bb	dd	aabbdd	G06

H01		H01	161	H01	8C	aa	bb	dd	aabbdd	H01
H03	231	H03	161	H03	24C	aa	bb	dd	aabbdd	H03
H04		H04	161	H04	32C	aa	bb	dd	aabbdd	H04
H06	231	H06	161	H06	48C	aa	bb	dd	aabbdd	H06
A08	231	80A		80A	AP 7000	aa	bb	dd	aabbdd	80A
A09	233	A09	161	A09	HANK	aa	BB	dd	aaBBdd	A09
A10	231	A10	161	A10	NICK	aa	bb	dd	aabbdd	A10
A11	231	A11	161	A11	WPB 52	aa	bb	dd	aabbdd	A11
A12		A12		A12	Hollis	aa	ВВ	dd	aaBBdd	A12
B07		B07		B07	H2O					B07
B08	231	B08	161	B08	BABE	aa	bb	dd	aabbdd	B08
B09	233	B09		B09	JEDD	AA	ВВ	dd	AABBdd	B09
B10	231	B10	161	B10	NORWE	aa	ВВ	dd	aaBBdd	B10
B11	233	B11	161	B11	WPB 92	aa	ВВ	dd	aaBBdd	B11
B12		B12		B12	Hollis	aa	ВВ	dd	aaBBdd	B12
C08		C08	161	C08	BOUND	AA	bb	D	AAbbD	C08
C09	231	C09		C09	JEFFERS	aa	ВВ	dd	aaBBdd	C09
C10	233	C10		C10	ORCF 10	aa	bb	dd	aabbdd	C10
C11	233	C11	161		WPB 93		ВВ	dd	aaBBdd	C11
C12		C12		C12	Volt	AA	bb	dd	AAbbdd	C12
D07		D07		D07	H2O	aa	bb	dd	aabbdd	D07
D08	231	D08		D08	BRUNDA		bb	dd	aabbdd	D08
D09	231	D09		D09		AA	ВВ	dd	AABBdd	D09
D10		D10		D10	ORCF 10		bb	dd	aabbdd	D10
D11	231	D11		D11	XERPHA		bb	dd	aabbdd	D11
D12		D12		D12	Volt	AA	bb	dd	AAbbdd	D12
E07		E07		E07	H2O	aa	bb	dd	aabbdd	E07
E08	231	E08		E08	CODA	aa	bb	dd	aabbdd	E08
E09		E09		E09	VOLT	AA	bb	dd	AAbbdd	E09
E10		E10		E10	ROD	aa	bb	dd	aabbdd	E10
E11	231	E11		E11	Express		bb	D	aabbD	E11
E12		E12		E12	Norin17		bb	dd	bbdd	E12
F07		F07		F07	H2O	aa	bb	dd	aabbdd	F07
F08	231	F08		F08		AA	ВВ	D	AABBD-	F08
F09	231	F09		F09	LAMBEF		bb	dd	aabbdd	F09
F10	231	F10		F10	STEPHEI		bb	dd	aabbdd	F10
F11		F11		F11		aa	bb	dd	aabbdd	F11
F12		F12		F12	Norin17		bb	dd	bbdd	F12
G07		G07		G07	H2O	aa	bb	dd	aabbdd	G07
G08	237	G08	161		EXPRESS		bb	D	aabbuu	G08
G09	231	G09		G09	LOUISE		bb	dd	aabbdd	G09
G10	231	G10	161		SOLANC		bb	D	aabbua aabbD-	G10
G13	231	G11		G11	Farnum		bb	D	aabbD_	G11
G12		G12		G12	ORCF10		bb	dd	aabbb_ aabbdd	G12
H07		H07		H07	H2O	aa	bb	dd	aabbdd	H07
H08		H08		H08	GOETZE		bb	dd	aabbdd	H08
H09	231	H09	161		MADSE		bb	dd	aabbdd	H09
1103	231	1103	101	1103	IVIADSEI	aa	טט	uu	ลลมมนน	1103

H10	231	H10	161 H10	TUBBS (aa	bb	dd	aabbdd	H10
H11		H11	. H11	Farnum aa	bb	D	aabbD_	H11
H12		H12	H12	ORCF10 aa	bb	dd	aabbdd	H12

Ventrii AMS I PinA	AMS [Vrn 1/	Vrn 1/ AMS [\	/rn 1/ Vrn 1/	AMS [Vrn Bf AM	S [96 w	e Samp	l PinB-	[VrnB-	VrnD-
271 A01	A01	A01		A01	A01		1C .	W		у
A05	A05 490	519 A05		A05	A05	A05	33C	W		y
271 B01	B01 490	519 B01		B01	B01		2C	W		•
B04	B04	519 B04		B04	B04		26C			
B05	B05 490	519 B05	717	B05	1174 B05		34C	w	У	у
	B06 490	519 B06		B06	B06		42C	W	,	,
271 C01	C01 490	519 CO1		C01	1174 C01		3C	w		
C04	C04	519 C01		C04	C04		27C	**		
C05	C05	C05		C05	1174 C05		35C	W		у
	C06 490	519 C06		C06	1174 C06		43C	w		У
271 D01	D01 490	519 D01		D01	D01		45C	W		У
	D01 490	519 D01 519 D02		D01	D02		12C	vv		У
D02 334 D03	D02 430	D03		D02	D02		20C			
D03	D03	519 D04		D03	D02		28C			
D05	D04	D05		D04	1174 D05		36C			v
										У
271 E01	E01 490	E01		E01	1174 E01		5C	W		У
	E02 490	519 E02	747	E02	E02		13C			
E03	E03	519 E03	717	E03	E03		21C			
E04	E04 490	519 E04	721	E04	E04		29C			
	E05	E05		E05	E05		37C			
	E06	E06		E06	E06		45C	W		У
271 F01	F01	F01		F01	F01		6C	W		
	F02 490	519 F02		F02	F02		14C	h		
F03	F03 490	F03		F03	1174 F03		22C	W		У
F04	F04	519 F04		F04	F04		30C			
	F06 490	519 F06		F06	F06		46C	W		У
G02	G02 490	519 G02		G02	G02		15C	W		
271 G03	G03 490	519 G03		G03	1174 G03		23C	W	У	У
	H02 490	519 H02		H02	H02		16C	h		
H05	H05 490	519 H05		H05	1174 H05		40C	W		У
	A02	A02		A02	A02		9C	W		
	A03 407	A03		A03	A03		17C	W		
	A04 490	519 A04		A04	A04		25C	W		
A06	A06	A06		A06	A06		41C			
	A07 490	519 A07		A07	A07		49C	W		У
280 B02	B02	B02		B02	B02	B02	10C			
280 B03 354	B03 490	B03		B03	B03		18C	W		
	C02 490	519 C02		C02	C02	C02	11C	W	У	
280 C03	C03	C03		C03	C03	C03	19C			
C07	C07	C07		C07	C07	C07	50C			
D06	D06	D06		D06	D06	D06	44C			
F05 354	F05	F05		F05	F05	F05	38C			
280 G01 354	G01	G01		G01	G01	G01	7C	W		
G04	G04	G04		G04	G04	G04	31C			
280 G05 354	G05	G05	717	G05	G05	G05	39C			
G06	G06	G06		G06	G06	G06	47C			

280	H01	354	H01	490	Н	01			H01		H01	H01	8C w		
	H03	354	H03	490	519 H	03			H03		H03	H03	24C w		
280	H04		H04		519 H	04			H04		H04	H04	32C		
	H06	354	H06	490	519 H	06			H06		H06	H06	48C w		
280	80A	354	80A	490	519 A	.08	721		80A		80A	A08	AP 70⊦w	У	y?
271	A09		A09		519 A	.09			A09		A09	A09	HANK w		У
271	A10	354	A10		519 A	10	709		A10		A10	A10	NICK w		У
280	A11	354	A11	490	519 A	.11			A11	1174	A11	A11	WPB 5 w	У	У
	A12		A12		Α	.12			A12		A12	A12	Hollis m		
	B07		B07			07			B07		B07	B07	H2O		
	B08	354			519 B				B08		B08	B08	BABE w		У
	B09		B09		519 B				B09		B09	B09	JEDD		У
	B10		B10	490	519 B		721		B10	1174		B10		У	У
	B11		B11		519 B				B11	1174		B11	WPB ^c w	У	У
	B12		B12			12			B12		B12	B12	Hollis m		
	C08		C08	490	519 C		721		C08		C08	C08	BOUNDARY	У	У
	C09	354			519 C				C09		C09	C09	JEFFERSON		У
	C10		C10	490	519 C		721		C10		C10	C10	ORCF w		У
	C11		C11		519 C				C11		C11	C11	WPB ^c w		У
	C12		C12			12			C12		C12	C12	Volt w		
	D07		D07			07			D07		D07	D07	H2O		
	D08		D08	490	519 D		721		D08	1174		D08	BRUN w	У	У
	D09		D09			09			D09	1174		D09	KELSE	У	У
	D10		D10	490	519 D		721		D10		D10	D10	ORCF 102	У	У
	D11		D11	490	519 D				D11	1174		D11	XERPI w	У	У
	D12		D12			12			D12		D12	D12	Volt w		
	E07		E07	400		07	724		E07		E07	E07	H2O		
	E08	354		490	519 E		721		E08	1174		E08	CODA w	У	У
	E09	354		400		09	724		E09		E09	E09	VOLT		У
	E10	354		490	519 E:		721		E10	1174		E10	ROD w	У	У
	E11		E11			11			E11		E11	E11	Expre: w	У	
	E12		E12 F07			12 07			E12 F07		E12 F07	E12 F07	Norin17b H2O		
	F07 F08	354					721		F07		F07	F07	EDDY m	.,	.,
	F09	354		490	519 F		721 717		F09	1174		F09	LAMB w	y y	У
	F10	354		490	519 F:		/1/		F10	1174		F10	STEPHW	У	y y
	F11	334	F11	450		11			F11		F11	F11	H2O	у	у
	F12		F12			12			F12		F12	F12	Norin17b		
	G07		G07			607			G07		G07	G07	H2O		
	G08		G08	490	519 G		709	721	G08	1174		G08	EXPREW	У	
	G09	354	G09	150	519 G		703	,	G09	11/ 1	G09	G09	LOUIS w	,	У
	G10	33 .	G10	490	519 G		721		G10	1174		G10	SOLAN w	У	,
	G11	354	G11	.50		11			G11	, T	G11	G11	Farnuim	7	
	G12		G12			12			G12		G12	G12	ORCF1w		
	H07		H07			07			H07		H07	H07	H2O		
	H08	354	H08		519 H				H08		H08	H08	GOET; w		У
	H09		H09	490	519 H				H09	1174		H09	MADSw	у	, У
						-				•				,	,

H10	H10	490	519 H10	721	H10	1174 H10	H10	TUBB! w	У	У
H11	354 H11		H11		H11	H11	H11	Farnu⊦m		
H12	H12		H12		H12	H12	H12	ORCF102		

VrnB-: VrnD-spring

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Sort 96 WI	E Samples \	WMC	BAR	WM	WM	BAR	BAR	Gwn	Gwn	Gwn Gwr	Umr	Umr	Umr	Ppd-	gwn	barc	Barc	Barc
1 A01	1C	134	172					169	219		301		418	307	130	219	298	134
2 A05	33C	149	164	136	164	139	167	169			301				130	226	298	134
3 B01	2C	134	172	136	148	139	151	169	219		301		418	307	130	219	298	134
4 B04	26C	149	164	136		139	167	169			301				130	219	298	134
5 B05	34C	149	164	136		139	167	169	219		301				130	226	298	134
6 B06	42C	134	164	136	164	139	167	169			301				130	219		
7 C01	3C	134	172	136	148	139	151	169	219		301		418	307	130	219	298	134
8 C04	27C	149	164					169	219		301		418	307	130	219	298	
9 C05	35C	149	164	136	164	139	167	169			301				130	226	298	134
10 C06	43C	134	164	136	164	139	167	169			301			307	130	219	301	134
11 D01	4C	134	172	136	148	139	151	169	219		301		418	307			298	134
12 D02	12C	149	164	136	164	139	167	163	169		320		436		124	219	301	134
13 D03	20C							169			301			307	130	226	298	134
14 D04	28C	149	164					169			301			307	130	219	298	134
15 D05	36C	149	164			139	167								130	219	298	134
16 E01	5C	134					151		219		301		418	307	130			
17 E02	13C	149	164	172		175		169			320		436		124			
18 E03	21C							169			301				130			
19 E04	29C		164	136	164	139	167	169	219		301		418	307	130	219	298	134
20 E05	37C	149																
21 E06	45C	134													130			
22 F01	6C	134						169			301		418	307	130			
23 F02	14C	149	174	136	164	139	167								124			
24 F03	22C							169			301				130			
25 F04	30C	149						169	219		301		418	307	130		298	134
26 F06	46C	134			164		167		240		301				130		200	407
27 G02	15C	149	164			167			219		320		440	207	124			
28 G03	23C	1.10	161	120	1.6.1	120	1.67	169	219		301			307	130			
29 H02	16C	149									320		436		124130			
30 H05 31 A02	40C 9C	149			104	173			219		301 301		110			221		
31 A02 32 A03	17C	146	171			173		169			301		418					141
32 A03 33 A04	25C			163		166		163			320				122			
34 A06	41C	143	100	103		100		169			301				120			
35 A07	49C	149						163			320				124			
36 B02	10C	143						103			301				124	221	230	147
37 B03	18C	146	179			173		169			301				120	221	202	141
38 CO2	11C	146				173			219		301		418		120			
39 C03	19C	140	1/3			1/3		103	213		301		410		120	221	250	171
40 C07	50C	134	172	136	148	139	151	169			301							
40 C07 41 D06	44C	146			- →0	100	-51	169			201			307				
42 F05	38C	146						169			301		418		120	221		
43 G01	7C		172	146		149			219				410		122		298	141
44 G04	31C	5				5						0						
45 G05	39C	146						169			301	320		442	120	221	298	141
46 G06	47C	146						169				320		442		221		
	="	. •																

47 H01	8C	146	171					169							120	221	298	141
48 H03	24C													307			298	
49 H04	32C	146	179					169				301		442	120	221		141
50 H06	48C											320			124	221	298	147
51 A08	AP 700C1	149	162	172		175		169	219			320	436	442	120	223	298	141
52 A09	HANK	####	159	161		164		165	214			301	418	307	128	228		
53 A10	NICK	134	172	136	148	139	151	165	169	214	219	320	436	307	130	219	301	134
54 A11	WPB 528	146	179	173		175		169	219			301	418	442			298	141
57 B08	BABE	120	171	164		167		163	214			301	418	307	130	219	301	141
58 B09	JEDD	165	159	164		167		165	214			301	418	307	128	228		
59 B10	NORWEST	149	174	148		151		169	219			301	418	442	120	226	298	141
60 B11	WPB 926	165	159	164		167		214				301	418	307	128	228	298	
62 C08	BOUNDAR	136	171	148		151		163	211			301		442		221	298	
63 C09	JEFFERSO1	165	159	164		167		165				301	418	307		228	298	141
64 C10	ORCF 101	149	168			149		169	219			320	436	442	130	226	298	141
65 C11	WPB 936	120	159	161		164		165	214			301	418	307	126	228	298	
68 D08	BRUNDAG	136	171	146		149		169	219			320	436	442		221	298	141
69 D09	KELSE	160	162	152		155		169	219			301	418	442	130	228	298	
70 D10	ORCF 102	149	162	146	164	149	167	169	219			320	436	442		221	298	141
71 D11	XERPHA	149	171	161		166		169	219			320	436	307		223	298	141
74 E08	CODA	136	168	146		149		169	219			320	436	442		226	298	141
75 E09	VOLT	156	168	172		175		169	219			301	418	307		221	298	141
76 E10	ROD	149	171	146		149		169	219			320	436	442		223	298	141
80 F08	EDDY	160	171			155		163	211			301	418	442	126	223	298	145
81 F09	LAMBERT	134	166	134	164	137	167	169	219			320	436	442		###	298	
82 F10	STEPHENS	134	166	146		149		169	219			320	436	442		226	298	141
86 G08	EXPRESSO	149	164	136	164	139	167	169	219			301	418	307	120	226	298	134
87 G09	LOUISE	134	179	148		151		165	214			301	418	442			301	141
88 G10	SOLANO	149	179	136	164	139	167	169	219			301	418	307	130	219	298	141
92 H08	GOETZE	136	157			175		165	214			320	436	442		230	298	
93 H09	MADSEN	149	162					169	219			320	436	442	122	223	298	141
94 H10	TUBBS 06	149	164	172		175						320	436	442	122	223	298	141

Baro	barc barc	Barc E	Barc Barc	Barc Ba	rc Baro	Barc E	Barc barc baı	rc wm «	identity to unknown 96 wel pin	В	96 WE
288	252	132		221	172		217	231	A01	161	A01
288	252	132	210	221	191	220	217	231	A05	161	A05
288	252	132		221	172		217	231	B01	161	B01
288	252	132		221	191		217	231	B04	161	B04
288	252	132	210	221	191	220	217	231	B05	161	B05
	252	124		221	191		217	231	B06	161	B06
288	252	132		221	172		217	231	C01	161	C01
288									C04	161	C04
288	252	132		221			217	231	C05	161	C05
288	252	124	210	221	191		217	231	C06		C06
288	252	132	210	221	172		217	231	D01	161	D01
288	252	132	207	221			217	231	D02	161	D02
288	252	132		221	220		217	231	D03		D03
288	252	132	210	221	191	220	217		D04	161	D04
288	252	132		221			217	231	D05		D05
288	252	132	210	221	172		217	231	E01	161	E01
288	252	124	207	219	172	191	198	231	E02	161	E02
288	252	132	210	221			217	231	E03	161	E03
288	252	132	210	221			217	231	E04	161	E04
288	252 258			221			203 21	7	E05		E05
288	252	124		221	191		217	231	E06		E06
288	252	132		217	172	217	217	231	F01	161	F01
288	252	124		221	191	220	198	231	F02	161	F02
288	252	132	210	221	191	220	217	231	F03	161	F03
288	252	132	210	221					F04	161	F04
288	252	132		221	191	220	217	231	F06	161	F06
288	252	132	207	219	172	191	198	231	G02	161	G02
288	252	132	210	221	191		217	231	G03	161	G03
###	252	132	207	221	172	191	217	231	H02	161	H02
288	252	132	210	221	191		217	231	H05	161	H05
296	258	124	214	217 22	1 172	191	203	231	A02	161	A02
296	258	124	214	217	172	191	203	231	A03	161	A03
273	252	124	210	225	174		201	231	A04	161	A04
296	258	124	214	217 22	1 172		203		A06		A06
288	254	132	214	225	172	193	194	231	A07	161	A07
	259								B02		B02
296	258	124	214	221			203	231	B03	161	B03
296	258	124		221	172	191	203	231	C02	161	C02
									C03		C03
									C07		C07
	258			217 22	1		203		D06		D06
296	258	124		217			203		F05		F05
273	254	124	210	221	172	191	203	231	G01	161	G01
									G04		G04
273	252 258	124	###	217 22	5 172	217	203		G05	161	G05
296	258	124	214	217 22	1 217		203		G06		G06

288	124	214	217 22	1 172	191 217	204			H01	161 H01
273 252	124 132		221 22	5 174	191	203	231		H03	161 H03
296 258	124	214	217	172	217	203			H04	161 H04
288 254	132	214	225	172	191	194	231		H06	161 H06
273 258	132	207	219	172	191	203	231	27.7	A08	A08
288 258	132	210	219	193	219	198	233	33.3	A09	161 A09
288 252	124	214	219 22	1 172	191	217	231	61.1	A10	161 A10
296 258	124	214	217	172	191	204	231	27.7	A11	161 A11
273 254	136	210	219			220	231	38.8	B08	161 B08
288 258	132	210	219			198	233	33.3	B09	B09
288 256	124	207	221	172	191	196	231	44.4	B10	161 B10
288 258	132	210	219	193	219	201	233	38.8	B11	161 B11
273 256	132	207	217			200		16.6	C08	161 C08
290 256	132	210	219			198	231	38.8	C09	C09
273 258	124	207	219	219		194	233	27.7	C10	C10
288 258	132	210	219	219		201	233	38.8	C11	161 C11
273 258	132	214	217			203	231	27.7	D08	D08
288 254	136	210	219	193	219	198	231	44.4	D09	D09
273 258	132	207	221			203		33.3	D10	D10
273 252	132	210	225			203	231	44.4	D11	D11
288 258	124	207	217			201	231	27.7	E08	E08
273 256	124	207	219			201		27.7	E09	E09
273 254	124	210	221			203		33.3	E10	E10
273 252	124	207	219	219		217	231	33.3	F08	F08
273 254	124 132	207	225			203	231	22.2	F09	F09
273 258	124	207	219	172	191	201	231	27.7	F10	F10
288 252	132	210	217			201	237	77.7	G08	161 G08
273 252	112	214	214 21	7		201	231	27.7	G09	G09
288 252	124	210	217			217	231	83.3	G10	161 G10
296 258	124		219	174	219	201		11.1	H08	H08
273 258	132	207	219	172	191	203	231	27.7	H09	161 H09
273 258	124 132	207	219 22	1 172	191 219	203	231	22.2	H10	161 H10

Sample	es A	В	D	Genome	AMS I	Ventri	ı AMS I	PinA	AMS DN	IA SVrn 1 <i>A</i>	AF / 1 V	rn 1AF / 1	AMS DNA 9
1C .	aa	bb	dd	aabbdd	A01		A01		A01		•	·	A01
33C	aa	bb	dd	aabbdd	A05		A05		A05		490	519	A05
2C	aa	bb	dd	aabbdd	B01	271	B01		B01		490		B01
26C	aa	bb	dd	aabbdd	B04		B04		B04				B04
34C	aa	bb	dd	aabbdd	B05		B05		B05		490		B05
42C	aa	bb	dd	aabbdd	B06		B06	354			490		B06
3C	aa	bb	dd	aabbdd	C01	271	C01		C01		490		C01
27C	aa	ВВ	dd	aaBBdd	C04		C04		C04				C04
35C	aa	bb	dd	aabbdd	C05		C05		C05				C05
43C	aa	bb	dd	aabbdd	C06		C06	354	C06		490	519	C06
4C	aa	bb	dd	aabbdd	D01	271	D01		D01		490		D01
12C	aa	ВВ	D	aaBBD-	D02		D02	354	D02		490		D02
20C	aa	bb	dd	aabbdd	D03		D03		D03				D03
28C	aa	bb	dd	aabbdd	D04		D04		D04			519	D04
36C	aa	bb	dd	aabbdd	D05		D05		D05				D05
5C	aa	bb	dd	aabbdd	E01	271	E01		E01		490		E01
13C	AA	ВВ	dd	AABBdd	E02		E02	354			490	519	E02
21C	aa	bb	dd	aabbdd	E03		E03		E03				E03
29C	aa	bb	dd	aabbdd	E04		E04		E04		490		E04
37C	aa	bb	dd	aabbdd	E05		E05	354	E05				E05
45C	aa	bb	dd	aabbdd	E06		E06	354					E06
6C	aa	bb	dd	aabbdd	F01	271	F01		F01				F01
14C	AA	ВВ	dd	AABBdd	F02		F02	354			490	519	
22C	aa	bb	dd	aabbdd	F03		F03		F03		490		F03
30C	aa	bb	dd	aabbdd	F04		F04		F04			519	F04
46C	aa	bb	dd	aabbdd	F06		F06	354			490	519	
15C	aa	ВВ	dd	aaBBdd	G02		G02		G02		490		G02
23C	aa	bb	dd	aabbdd	G03	271	G03		G03		490	519	G03
16C	AA	bb	D	AAbbD-	H02		H02	354	H02		490		H02
40C	aa	bb	dd	aabbdd	H05		H05		H05		490		H05
9C	aa	bb	dd	aabbdd	A02	280	A02	354	A02				A02
17C	aa	bb	dd	aabbdd	A03		A03		A03		407		A03
25C	aa	bb	dd	aabbdd	A04		A04		A04		490	519	A04
41C	aa	bb	dd	aabbdd	A06		A06		A06				A06
49C	aa	bb	dd	aabbdd	A07		A07	354	A07		490	519	A07
10C	aa	ВВ	dd	aabbdd	B02	280	B02		B02				B02
18C	aa	bb	dd	aabbdd	B03		B03	354	B03		490		B03
11C	aa	bb	dd	aabbdd	C02	280	C02	354	C02		490	519	C02
19C	aa	bb	dd	aabbdd	C03	280	C03		C03				C03
50C	aa	bb	dd	aabbdd	C07		C07		C07				C07
44C	aa	bb	dd	aabbdd	D06		D06		D06				D06
38C	aa	bb	dd	aabbdd	F05		F05	354					F05
7C	aa	bb	dd	aabbdd	G01	280	G01	354	G01				G01
31C	aa	bb	dd	aabbdd	G04		G04		G04				G04
39C	aa	bb	dd	aabbdd	G05	280	G05	354	G05				G05
47C	aa	bb	dd	aabbdd	G06		G06		G06				G06

8C aa	bb	dd	aabbdd	H01	280 H01	354 H01	490	H01
24C aa	bb	dd	aabbdd	H03	H03	354 H03	490	519 H03
32C aa	bb	dd	aabbdd	H04	280 H04	H04		519 H04
48C aa	bb	dd	aabbdd	H06	H06	354 H06	490	519 H06
AP 700C aa	bb	dd	aabbdd	80A	280 A08	354 A08	490	519 A08
HANK aa	BB	dd	aaBBdd	A09	271 A09	A09		519 A09
NICK aa	bb	dd	aabbdd	A10	271 A10	354 A10		519 A10
WPB 52 aa	bb	dd	aabbdd	A11	280 A11	354 A11	490	519 A11
BABE aa	bb	dd	aabbdd	B08	B08	354 B08		519 B08
JEDD AA	BB	dd	AABBdd	B09	271 B09	B09		519 B09
NORWE aa	BB	dd	aaBBdd	B10	280 B10	354 B10	490	519 B10
WPB 92 aa	BB	dd	aaBBdd	B11	271 B11	B11		519 B11
BOUND, AA	bb	D	AAbbD_	C08	C08	354 C08	490	519 C08
JEFFERS aa	BB	dd	aaBBdd	C09	C09	354 C09		519 C09
ORCF 1(aa	bb	dd	aabbdd	C10	C10	354 C10	490	519 C10
WPB 93 aa	ВВ	dd	aaBBdd	C11	C11	C11		519 C11
BRUND/ aa	bb	dd	aabbdd	D08	280 D08	354 D08	490	519 D08
KELSE AA	BB	dd	AABBdd	D09	D09	354 D09		D09
ORCF 1(aa	bb	dd	aabbdd	D10	D10	354 D10	490	519 D10
XERPHA aa	bb	dd	aabbdd	D11	D11	354 D11	490	519 D11
CODA aa	bb	dd	aabbdd	E08	E08	354 E08	490	519 E08
VOLT AA	bb	dd	AAbbdd	E09	E09	354 E09		E09
ROD aa	bb	dd	aabbdd	E10	E10	354 E10	490	519 E10
EDDY AA	BB	D	AABBD-	F08	F08	354 F08		F08
LAMBEFaa	bb	dd	aabbdd	F09	F09	354 F09	490	519 F09
STEPHEIaa	bb	dd	aabbdd	F10	F10	354 F10	490	519 F10
EXPRES: aa	bb	D	aabbD-	G08	280 G08	G08	490	519 G08
LOUISE aa	bb	dd	aabbdd	G09	G09	354 G09		519 G09
SOLANC aa	bb	D	aabbD-	G10	G10	G10	490	519 G10
GOETZE aa	bb	dd	aabbdd	H08	H08	354 H08		519 H08
MADSEl aa	bb	dd	aabbdd	H09	H09	354 H09	490	519 H09
TUBBS Caa	bb	dd	aabbdd	H10	H10	H10	490	519 H10

Vrn 1AF / lı Vrn 1A	AF / II AMS DNA !	Vrn BF BR4	AMS D	NA 996 well	Samples	VrnB-winter	VrnD-winter
	A01		A01	A01	1C		У
	A05		A05	A05	33C		У
	B01		B01	B02	2C		
	B04		B04	B04	26C		
717	B05	1174	B05	B05	34C	У	У
	B06		B06	B06	42C		
	C01	1174	C01	C01	3C		
	C04		C04	C04	27C		
	C05	1174	C05	C05	35C		У
	C06	1174	C06	C06	43C		У
	D01		D01	D01	4C		У
	D02		D02	D02	12C		•
	D03		D03	D03	20C		
	D04		D04	D04	28C		
	D05	1174	D05	D05	36C		у
	E01	1174		E01	5C		У
	E02		E02	E02	13C		•
717	E03		E03	E03	21C		
721	E04		E04	E04	29C		
	E05		E05	E05	37C		
	E06		E06	E06	45C		у
	F01		F01	F01	6C		•
	F02		F02	F02	14C		
	F03	1174		F03	22C		у
	F04		F04	F04	30C		,
	F06		F06	F06	46C		у
	G02		G02	G02	15C		,
	G03	1174		G03	23C	У	у
	H02		H02	H02	16C	•	•
	H05	1174		H05	40C		у
	A02		A02	A02	9C		•
	A03		A03	A03	17C		
	A04		A04	A04	25C		
	A06		A06	A06	41C		
	A07		A07	A07	49C		у
	B02		B02	B02	10C		•
	B03		B03	B03	18C		
	C02		C02	C02	11C	У	
	C03		C03	C03	19C	,	
	C07		C07	C07	50C		
	D06		D06	D06	44C		
	F05		F05	F05	38C		
	G01		G01	G01	7C		
	G04		G04	G04	31C		
717	G05		G05	G05	39C		
· _ ·	G06		G06	G06	47C		
					🕶		

	H01	H01	H01	8C		
	H03	H03	H03	24C		
	H04	H04	H04	32C		
	H06	H06	H06	48C		
721	A08	A08	80A	AP 700C1	У	y?
	A09	A09	A09	HANK		У
709	A10	A10	A10	NICK		У
	A11	1174 A11	A11	WPB 528	У	У
	B08	B08	B08	BABE		У
	B09	B09	B09	JEDD		У
721	B10	1174 B10	B10	NORWEST 553	У	У
	B11	1174 B11	B11	WPB 926	У	У
721	C08	C08	C08	BOUNDARY	У	У
	C09	C09	C09	JEFFERSON		У
721	C10	C10	C10	ORCF 101		У
	C11	C11	C11	WPB 936		У
721	D08	1174 D08	D08	BRUNDAGE 96	У	У
	D09	1174 D09	D09	KELSE	У	У
721	D10	D10	D10	ORCF 102	У	У
	D11	1174 D11	D11	XERPHA	У	У
721	E08	1174 E08	E08	CODA	У	У
	E09	E09	E09	VOLT		У
721	E10	1174 E10	E10	ROD	У	У
721	F08	F08	F08	EDDY	У	У
717	F09	1174 F09	F09	LAMBERT	У	У
	F10	1174 F10	F10	STEPHENS	У	У
709	721 G08	1174 G08	G08	EXPRESSO	У	
	G09	G09	G09	LOUISE		У
721	G10	1174 G10	G10	SOLANO	У	
	H08	H08	H08	GOETZE		У
	H09	1174 H09	H09	MADSEN	У	У
721	H10	1174 H10	H10	TUBBS 06	У	У

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sort Plat 96 we BR samp growth h phenotyp 384 v wm (384 gwn gwn 384 barc 384 gdm gdm 384 gdm 384 barc
105
      2 A09 180-1
                      winter
                             awned
                                      B17
                                               B17
                                                           B17
                                                                    B17 153
                                                                                B17 208 B17 295
117
      2 BO9 180-2
                                      D17
                                               D17
                                                           D17
                                                                    D17 153
                                                                                D17 208 D17 295
                      winter
                             awned
170
      2 GO2 181-1
                      spring
                                      N03 230 N03 158
                                                           N03 226 N03 153
                                                                                N03 208 N03 295
                             awned
 28
      1 CO4 181-2
                                      E07
                                           230 E07 158
                                                           E07 226 E07 153
                                                                                E07 208 E07 295
                      winter
                             awned
 77
      1 G05 181-3
                      Lspring awned
                                      M09 230 M09 158
                                                           M09 226 M09 153
                                                                                M09 208 M09 295
 61
      1 FO1 181-4
                      Lspring awned
                                      K01 230 K01 158
                                                           K01 226 K01 153
                                                                                K01
                                                                                        K01 295
169
      2 G01 182 (1)-1L spring awned
                                      N01 230 N01 158
                                                           N01 226 N01 153
                                                                                N01 208 N01 295
 50
      1 EO2 182 (1)-2L spring awned
                                      103
                                           230 103 158
                                                           103 226 103 153
                                                                                103 208 103 295
 40
      1 D04 182 (2)-4 winter
                                      G07
                                           230 G07 158
                                                           G07 226 G07 153
                                                                                G07 208 G07 295
                             awned
122
      2 CO2 182 (2)-5 winter
                                      F03
                                           230 F03 158
                                                           F03 226 F03 153
                                                                                F03
                                                                                        F03 295
                             awned
                                                                                N19 208 N19 295
178
      2 G10 182(1)-3 L spring awned
                                      N19
                                               N19
                                                           N19
                                                                    N19 153
 83
      1 G11 183-1
                                      M21 230 M21158
                                                           M21226 M21153
                                                                                M21208 M21295
                     winter
                             awned
  5
      1 A05 183-2
                      winter
                             awned
                                      A09
                                           230 A09 158
                                                           A09 226 A09 153
                                                                                A09 208 A09
101
                                      B09
                                           230 B09 158
                                                           B09 226 B09 153
                                                                                B09 208 B09 295
      2 A05 183-3
                      winter
                             awned
 53
      1 E05 183-4
                      Lspring awned
                                      109
                                           230 109 158
                                                           109 226 109 153
                                                                                109 208 109 295
189
      2 H09 184-1
                                      P17
                                               P17
                                                           P17
                                                                                P17 208 P17 295
                     Lspring awned
                                                                    P17 153
106
      2 A10 184-2
                      winter
                                      B19
                                               B19
                                                           B19
                                                                    B19 153
                                                                                B19 208 B19 295
                             awned
      2 B10 185-1
                      Lspring awned
                                                           D19
                                                                                D19 208 D19 295
118
                                      D19
                                               D19
                                                                    D19 153
      2 B06 185-2
114
                      Lspring awned
                                      D11 230 D11 158
                                                           D11 226 D11 153
                                                                                D11 208 D11 295
113
      2 B05 186-1
                                      D09
                                           230 D09 158
                                                           D09 226 D09 153
                                                                                D09
                                                                                        D09 295
                      spring
                             awned
 51
      1 E03 187-1
                      winter
                             awned
                                      105
                                           230 105 158
                                                           105 226 105 151 157 105 208 105 295
102
      2 A06 187-2
                                          230 B11
                                                           B11 226 B11 151 157 B11 208 B11 295
                      winter
                             awned
                                      B11
 91
      1 H07 188-1
                      winter
                             awned
                                      013 230 013 158
                                                           013 226 013 153
                                                                                013 208 013
 57
      1 E09 188-2
                                      117
                                           230 I17 158
                                                           I17 226 I17 153
                                                                                I17 208 I17 295
                      winter
                             awned
 16
      1 B04 189-1
                      winter
                             awnlet
                                      C07
                                           230 C07 165
                                                           C07 226 C07 151 157 C07 207 C07
 92
      1 H08 189-2
                                      015
                                          230 O15 165
                                                           015 226 015 151 157 015 207 015 292
                      winter
                             awnlet
      2 H05 190-1
                                                           P09 226 P09 153
185
                      spring
                             awned
                                      P09
                                           230 P09 158
                                                                                P09 208 P09 295
136
      2 D04 191-1
                                      H07 230 H07 158
                                                           H07 226 H07 153
                                                                                H07 208 H07 292
                      winter
                             awnless
 82
      1 G10 191-2
                      winter
                             awnless
                                      M19
                                               M19
                                                           M19
                                                                    M19
                                                                                M19
                                                                                        M19
  2
      1 A02 191-3
                                      A03 230 A03 158
                                                           A03 226 A03 153
                                                                                A03
                      winter
                             awnless
                                                                                        A03 292
 81
                                                           M17226 M17151 157 M17207 M17
      1 G09 192-1
                      Espring awned
                                      M17 230 M17158
 33
      1 CO9 192-2
                                                           E17 226 E17 151 157 E17 207 E17 292
                      Espring awned
                                      E17
                                           230 E17 158
157
      2 F01 192-3
                      E spring awned
                                      L01
                                           230 L01 158
                                                           LO1 226 LO1 151 157 LO1 207 LO1 292
 89
      1 H05 193-1
                                          230 009 158
                                                           009 226 009 151 157 009 207 009
                      winter
                                      009
                             awned
                                                           001 226 001 151 157 001 207 001 292
 85
      1 H01 193-2
                      winter
                             awned
                                      001
                                           230 001 158
 17
      1 B05 193-3
                                      C09
                                           230 C09 158
                                                           C09 226 C09 151 157 C09 207 C09 292
                      winter
                             awned
 58
      1 E10 193-4
                      winter
                             awned
                                      119
                                           230 I19
                                                           119 226 119
                                                                                I19 207 I19 292
 88
      1 H04 193-5
                      winter
                             awned
                                      007 230 007 158
                                                           007 226 007 151 157 007 207 007 292
                                           230 O23
 96
      1 H12 194-1
                      winter
                             awned
                                      023
                                                           023 226 023 153
                                                                                023 207 023 292
142
      2 D10 194-2
                                      H19
                                               H19
                                                           H19
                                                                    H19 153
                      winter
                                                                                H19 207 H19 292
                             awned
147
      2 E03 194-3
                      winter
                             awned
                                      J05
                                           230 J05 158
                                                           J05 226 J05 153
                                                                                J05 207 J05 292
 98
      2 AO2 195-1
                                      B03
                                           230 B03 158
                                                           B03 226 B03 151 157 B03 207 B03 292
                      Espring awned
 70
      1 F10 195-2
                      Espring awned
                                      K19
                                           230 K19 158
                                                           K19 226 K19 151 157 K19
                                                                                        K19 292
172
      2 GO4 195-3
                                                           N07 226 N07 151 157 N07 207 N07
                      Espring awned
                                      N07 230 N07 158
 67
      1 F07 196-1
                      Espring awnless
                                      K13
                                           230 K13 158
                                                           K13 226 K13 151 157 K13 207 K13 292
 71
      1 F11 196-2
                      E spring awnless K21 230 K21 158
                                                           K21 226 K21
                                                                                K21 207 K21 292
```

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27
      1 CO3 196-3
                     E spring awnless E05
                                         230 E05 158
                                                           E05 226 E05 151 157 E05 207 E05 292
 30
      1 CO6 196-4
                     spring
                             awnless
                                     E11
                                          230 E11 158
                                                           E11 226 E11 151 157 E11 207 E11 292
99
      2 A03 197-1
                                     B05
                                          230 B05 158
                                                           B05 226 B05 153
                                                                                B05 208 B05 292
                     Espring awned
18
      1 B06 197-2
                     Espring awned
                                     C11
                                          230 C11 158
                                                           C11 226 C11 153
                                                                               C11 208 C11 292
161
      2 F05 197-3
                                     L09
                                          230 L09 158
                                                           L09 226 L09 153
                                                                               L09 208 L09 292
                     Espring awned
182
      2 HO2 197-4
                     Espring awned
                                     P03
                                          230 P03 158
                                                           P03 226 P03 153
                                                                               P03 208 P03 292
153
      2 E09 198-1R winter
                                                                               J17 207 J17 292
                             awned
                                     J17
                                               J17
                                                           J17
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165
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177
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37
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123
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 39
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90
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184
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80
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                                                           M15 226 M15
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49
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                                                           101 226 101 153
                                                                               101 208 101 292
95
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                                                           021
130
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                                               F19
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                                                                   F19 151 157 F19 207 F19 292
134
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                                     H03
133
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                                     H01 230 H01 158
42
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                                                           G11 226 G11 151 157 G11 207 G11 292
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86
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                                                           003 226 003 151 157 003 207 003
125
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48
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159
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112
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                                                                                        D07 292
121
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                                                           F01 226 F01 153
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54
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109
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146
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55
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64
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111
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                                                           D05 226 D05 153
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46
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110
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                                                           D03 226 D03 153
                                                                                D03 207 D03 292
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26
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                                                           E03 226 E03 153
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22
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                                                           C19 226 C19 153
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                                                                               J01 207 J01 292
173
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                                          230 N09 158
                                                           N09 226 N09 153
                                                                               N09 207 N09 292
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87
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                                     005
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                                                           005 226 005 153
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38
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                                                                                       G03 292
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13
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                             awned
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                                                                               C01 207 C01 292
19
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      1 B09 211-3
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25
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45
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97
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                                                           M03226 M03153
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62
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 69
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93
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                                                                               017 207 017 292
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                                     017
                                          230 017 158
 12
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                                                           A23 226 A23 153
                                                                               A23 207 A23 292
154
      2 E10 214-1
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                                              J19
                                                           J19
                                                                   J19 153
                                                                               J19 207 J19 292
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 34
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20
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56
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                                                           I15 226 I15 153
23
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                                                           C21 226 C21 153
                                                                               C21
                                                                                       C21 292
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44
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73
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141
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32
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      2 D05 218-2
137
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                                                           A13 226 A13 153
166
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                                              L19
                                                           L19
                                                                   L19 153
                                                                               L19 208 L19 292
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                                                           107 226 107 153
                                                                               107 208 107 292
52
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59
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                                                           121 226 121
                                                                               I21 208 I21 292
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84
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                                                           M07226 M07153
                                                                               M07208 M07292
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                                                                               123 208 123 292
 60
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                                          230 123 158
                                                           123 226 123 153
                     spring
                             awned
      1 F08 220-4
 68
                     spring
                             awned
                                     K15
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                                                           K15 226 K15 153
                                                                               K15 208 K15
75
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 63
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94
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79
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66
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 31
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124
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160
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149			224-3	spring 	awned	J09	230	J09	158		226	J09						292
190			224-4	L spring		P19	•	P19	4=0	P19		P19						292
41			224-5	spring	awned	G09		G09				G09						292
15			225-1	L spring		C05		C05				C05				208		292
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29	1	C05	225-3	spring	awned	F09		F09		F09	226	F09	153		F09	208	F09	
65	1	F05	225-4	winter	awned	K09	230	K09	158	K09	226	K09	153		K09	208	K09	292
158	2	F02	225-5	spring	awned	L03	230	L03	158	L03	226	L03	153		L03	208	L03	292
72	1	F12	226-1	spring	awned	K23	230	K23		K23	226	K23			K23	208	K23	
171	2	G03	226-2	spring	awned	N05	230	N05	158	N05	226	N05	153		N05	208	N05	292
148	2	E04	227-1	winter	awnless	J07	230	J07	165	J07	226	J07	151	157	J07		J07	292
43	1	D07	227-2	winter	awnless	G13	230	G13	165	G13	226	G13	153		G13		G13	292
181	2	H01	227-3	winter	awnless	P01	230	P01	165	P01	22 6	P01	151	157	P01	208	P01	292
24	1	B12	227-4	winter	awnless	C23	230	C23	165	C23	226	C23	153		C23	207	C23	292
135	2	D03	227-5	winter	awnless	H05	230	H05	165	H05	226	H05	153		H05		H05	292
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115	2	B07	ams22			D13	230	D13	158	D13	226	D13	153		D13	208	D13	292
127	2	C07	ams36			F13	230	F13	158	F13	226	F13	153		F13	208	F13	295
139	2	D07	ams45			H13	230	H13	158	H13	226	H13	153		H13	207	H13	
187	2	H07	Blanca g	rande		P13	230	P13	153	P13	238	P13	149	153	P13	207	P13	292
104	2	80A	br325			B15	230	B15	165	B15	226	B15	153		B15	208	B15	292
116	2	B08	br326			D15	230	D15	165	D15	238	D15	153	157	D15	208	D15	292
128	2	C08	br327			F15	230	F15	153	F15	238	F15	153		F15	208	F15	292
151	2	E07	express			J13	230	J13	153	J13	238	J13	153		J13	208	J13	292
163	2	F07	expresso)		L13	237	L13	153	L13	238	L13	153		L13	208	L13	292
175	2	G07	solano			N13	230	N13	153	N13	226	N13	151	157	N13	208	N13	292
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131	2	C11				F21		F21		F21		F21			F21		F21	
132	2	C12				F23		F23		F23		F23			F23		F23	
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144	2	D12				H23		H23		H23		H23			H23		H23	
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152	2	E08				J15		J15		J15		J15			J15		J15	
156	2	E12				J23		J23		J23		J23			J23		J23	
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164		F08				L15		L15		L15		L15			L15		L15	
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174		G06				N11		N11		N11		N11			N11		N11	
176		G08				N15		N15		N15		N15			N15		N15	
179		G11				N21		N21		N21		N21			N21		N21	

180	2 G12	N23	N23	N23	N23	N23	N23
186	2 H06	P11	P11	P11	P11	P11	P11
188	2 H08	P15	P15	P15	P15	P15	P15
191	2 H11	P21	P21	P21	P21	P21	P21
192	2 H12	P23	P23	P23	P23	P23	P23

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	H03	174	H04	239	H03	348	H03		H04	147							H03			H03	
	H01	174	H02	239	H01	348	H01		H02		H01	217		H02			H01			H01	146
	G11	174	G12	239	G11	348	G11		G12	150	G11	217	221	G12	124		G11	216	221	G11	
	003	174	004	239	003	348	003		004	150	003	217		004	124		003			003	146
	F09	170	F10	239	F09	348	F09		F10	147	F09			F10	124	133	F09			F09	
	G23	174	G24	239	G23	348	G23		G24	150	G23	217		G24	124		G23	216		G23	
	L05	174	L06	239	L05	348	L05		L06	150	L05	217		L06	124		L05	216		L05	146
	E21	174	E22	2 39	E21	348	E21		E22	150	E21	217		E22	124	133	E21			E21	
	C03	174	C04	243	C03	348	C03		C04	147	C03	217		C04	133		C03			C03	146
	D07	174	D08	243	D07	348	D07		D08	147	D07	217		D08	133		D07	216		D07	146
	F01	174	F02	243	F01		F01	354	F02	147	F01	217		F02	133		F01	216		F01	146
	A19	174	A20	243	A19	348	A19		A20	147	A19	217		A20	133		A19	216		A19	
									112	147	111	217		112	133		l11			l11	146
			A18						A18		A17			A18			A17			A17	146
	D01	174	D02	243	D01	348	D01	354	D02	147	D01	217		D02	133		D01			D01	
285	103	174	J04	243	103	348	103		J04	147	103			J04	124	133	103	216		J03	146
									A12		A11			A12			A11			A11	146
			H12			348			H12		H11			H12			H11			H11	
			114				113		114		113			114			l13	216		l13	146
			A06						A06		A05			A06			A05			A05	146
			K08						K08		K07			K08			K07			K07	146
			D06						D06		D05			D06			D05			D05	146
			G20				G19		G20		G19			G20			G19			G19	4
			D04							147	D03			D04			D03			D03	146
	F03	174	£04	243	F03	348	F03	354	E04	147	E03	217		E04	133		£03	216		E03	146

C19 174 C20 243	C19 348 C19	C20 147	C19 217	C20 133	C19	C19	
J01 174 J02 243	J01 348 J01	J02 147	J01 217	J02 133	J01	J01	146
N09 174 N10 243	N09 348 N09	N10 147	N09	N10 133	N09	N09	146
005 174 006 243	005 348 005	O06 147	O05 217	006 133	O05	005	146
G03 174 G04 243		G04 147	G03 217	G04 133	G03	G03	146
C01 174 C02 243		C02 147	C01 217	C02 133	C01	C01	146
C13 174 C14 243		C14 147	C13 217	C14 133	C13 216	C13	146
				C14 133 C18 133			
C17 174 C18 243		C18 147	C17 217		C17 216	C17	146
E01 174 E02 243		E02 147	E01 217	E02 133	E01 216	E01	146
G17 174 G18 243		G18 147	G17 217	G18 133	G17	G17	
B01 174 B02 243		B02 147	B01 217	B02 133	B01	B01	146
M03 174 M04 243		M04 147	M03 217	M04 133	M03	M03	
K03 174 K04 243	K03 348 K03	K04 147	K03 217	K04 133	K03	K03	146
K17 174 K18 243	K17 348 K17	K18 147	K17 217	K18 133	K17	K17	146
017 174 018 243	017 348 017	O18 147	O17 217	018 133	O17 216	017	
A23 174 A24 243	A23 348 A23	A24 147	A23 217	A24 133	A23 216	A23	146
J19 174 J20 243	J19 348 J19 354	J20 147	J19 217	J20 133	J19 216	J19	146
E19 174 E20 243	E19 348 E19	E20 147	E19 217	E20 116 133	E19	E19	
C15 174 C16 243	C15 348 C15	C16 147	C15 217	C16 133	C15 216	C15	146
I15 174 I16 243	115 348 115	I16 147	I15 217	I16 133	I15 216	l15	146
C21 174 C22 243	C21 348 C21	C22 147	C21 217	C22 133	C21 216	C21	146
G15 174 G16 243		G16 147	G15 217	G16 133	G15 216	G15	146
M01174 M02243		M02 147	M01217	M02133	M01	M01	1.0
P05 174 P06 243		P06 147	P05 217	P06 133	P05 216	P05	
F17 169 F18 239		F18 147	F17 217	F18 124 133		F17	146
	H17 348 H17			H18 124 133		H17	140
		H18 147	H17 217				1.10
E15 170 E16 239		E16 147	E15 217	E16 124 133		E15	146
H09 170 H10 239		H10 147	H09 217	H10 124 133		H09	4.46
A13 170 A14 239		A14 147	A13 217	A14 133	A13 216	A13	146
L19 170 L20 239		L20 147	L19 217	L20 124 133		L19	146
107 170 108 239		108 147	107 217	108 133		107	146
121 170 122 239		122 147	I21 217	122 133	I21 216	121	
M23170 M24239		M24 147	M23217	M24133	M23216	M23	146
M07 170 M08 239	M07348 M07	M08 147	M07217	M08 133	M07216	M07	146
123 170 124 23 9	123 348 123	124 147	I23 217	124 133	123 216	123	
K15 K16 239	K15 348 K15	K16 147	K15 217	K16 133	K15 216	K15	146
M05 170 M06 239	M05348 M05	M06 147	M05 217	M06 124 133	M05	M05	146
K05 170 K06 239	K05 348 K05	K06 147	K05 217	K06 124 133	K05 216	K05	146
E23 E24 239	E23 348 E23	E24 147	E23 217	E24 133	E23	E23	
O19 O20 239	019 348 019 354	020	O19 217	O20 124 133	019 216	019	
M13170 M14239		M14 147	M13217		M13216	M13	146
	K11 348 K11	K12 147	K11 217	K12 133	K11 216	K11	146
E13 170 E14 239		E14 147	E13 217	E14 133	E13	E13	146
M11170 M12239		M12147	M11	M12124	M11	M11	142
	A21 348 A21		A21 221	A22 124	A21	A21	142
	F07 348 F07	F08 147	F07 221	F08 124	F07	F07	142
LU/ 1/U LU8 239	L07 348 L07	L08 147	L07 221	L08 124	L07 221	L07	142

C21 170 C22	220 (21.2	40 C21	C22 147	C21 221	C22 124	C21 221	C21
G21 170 G22	239 J09 3		G22 147	G21 221	G22 124	G21 221	G21
			J10 147		J10 124 133		J09
P19 170 P20 G09 170 G10			P20 147 G10 147	P19 221	P20 124	P19 221	P19
C05 170 C06				G09 221	G10 124	G09 221	G09 142
			C06 147	C05 217	C06 133	C05 216	C05 146
A07 170 A08 E09 174 E10			A08 147	A07 217	A08 124 133		A07
			E10 150	E09 217	E10 124	E09	E09 146
K09 170 K10			K10 147	K09 217	K10 124 133		K09
L03 170 L04			L04 147	L03 217	L04 124	L03	L03 146
K23 170 K24			K24 147	K23 217	K24 133	K23 216	K23 146
N05 170 N06			N06 147	N05 217	N06 133	N05	N05 146
J07 174 J08			J08 147	J07 219	J08 133	J07 221	J07 142
G13 174 G14 P01 174 P02			G14	G13 221	G14 133	G13	G13 142
			P02	P01 221	P02 116	P01	P01 142
C23 174 C24 H05 174 H06			C24	C23 221	C24 133	C23	C23 142
			H06	H05 221	H06 133	H05 221	H05 142
B13 B14		48 B13	B14	B13 221	B14 116	B13	B13
D13 D14		48 D13	D14	D13	D14	D13	D13
F13 F14		48 F13 48 H13	F14	F13	F14	F13	F13
H13 H14 P13 174 P14			H14 4 D14 14E	H13	H14 116	H13	H13 P13 146
B15 B16		46 P15 55 48 B15		P13 217	P14 133	P13 216 B15	
	243 D15 3		B16	B15	B16 116 D16 116	D15	B15
F15 F16		48 F15	D16 F16	D15	F16	F15	D15 F15
J13 174 J14			J14 147	F15 J13 221	J14 133	J13 221	J13 142
L13 174 L14	L13	L13	L14 147	L13 221	L14 133	L13 221	L13 142
N13 174 N14			N14 147	N13 217	N14 124	N13 216	N13 146
D21 174 D22		48 D21	D22 147	D21 221	D22 133	D21 221	D21
H21 174 H22			H22 147	H21 217 221		H21 216 221	
J21 174 J22			J22 147	J21	J22 133	J21 Z10 ZZ1	J21
L21 172 L22			L22 147 156		L22 124	L21 221	L21 146
B21 174 B22		48 B21		B21 217	B22 116	B21 216	B21 146
B23 B24			4 B24 147 154		B24 107 124		B23
D23 D24		48 D23	D24	D23 218	D24 133	D23 216	D23
F21 169 F22				F21 217	F22 133	F21	F21
F23 F24		48 F23		F23 217	F24 124	F23	F23
H15 H16		48 H15	H16	H15	H16 116	H15	H15
H23 H24		48 H23	H24 150	H23	H24 133	H23	H23
J11 J12		48 J11	J12	J11	J12	J11	J11
J15 J16		48 J15	J16	J15 217	J16 116	J15	J15
J23 J24		48 J23	J24 150	J23 221	J24 124	J23 221	J23
L11 L12		48 L11	L12	L11	L12	L11	L11
L15 L16	L15	L15	L16	L15	L16 116	L15	L15
L23 L24		48 L23	L24 130 139		L24 133	L23 221	L23
N11 N12		N11	N12	N11	N12	N11	N11
N15 N16		N15	N16	N15	N16 116	N15	N15
N21 N22	241 N21 3	48 N21	N22 145	N21	N22 133	N21	N21

N23	N24	N23 348	N23	N24 150	N23 221	N24 133	N23	N23
P11	P12	P11 348	P11	P12	P11	P12 116	P11	P11
P15	P16	P15 348	P15	P16	P15	P16 116	P15	P15
P21	P22	P21	P21	P22	P21 218	P22 116	P21	P21
P23	P24	P23	P23	P24 139 154	P23	P24 112	P23	P23

gwm 384 \wn	nc 384 v Ve	entriup s	sam seed coat color
B18 24	2 B17		180-1
D18 24	2 D17		
N04	N03		181- aabbdd
E08 24	2 E07	:	181- aabbdd
M10	M09	:	181- aabbdd
K02 24	2 K01	:	181- aabbdd
N02	N01	:	182 aabbdd
104 24	2 103	:	182 aabbdd
G08 24	2 G07	:	182 aabbdd
F04 24	2 F03		182 aabbdd
N20 24	2 N19	:	198- aabbdd
M22	M21		183- aabbdd
A10 24	2 A09		183- aabbdd
B10 24	2 B09		183- aabbdd
I10 24	2 109		183- aabbdd
P18 24	2 P17		
B20 24	2 B19	:	184- aabbdd
D20 24	2 D19 2	81	180- aabbdd
D12 24	2 D11	:	185- aabbdd
D10 24	2 D09		186- aabbdd
I06 24	2 105		187- aabbdd
B12 24	2 B11		187- aabbdd
O14 24			188- aabbdd
I18 24	2 117	:	188- aabbdd
C08 24	2 C07		189- aabbdd
016	015	:	189- aaBBdd
P10 24			190- aabbdd
H08 24			191- aaBBdd
M20	M19		191- aaBBdd
	2 A03		191- aaBBdd
153 M18 24			192- aaBBdd
153 E18 24			192- aaBBdd
	2 LO1		192- aaBBdd
153 010 24			193- aaBBdd
153 002 24			193- aaBBdd
	2 CO9		193- aaBBdd
120	119		193- aaBBdd
153 008 24			193- aaBBdd
	2 023		194- aabbdd
	2 H19		217- aabbdd
	2 J05		194- aabbdd
	2 B03		195- AABBdd
153 K20	K19		195- aaBBdd
153 N08 24			195- aaBBdd
153 K14	K13		196- aabbdd
K22 24	2 K21		196- aabbdd

153	E06	242	E05	196- aabbdd
153	E12	242	E11	196- aabbdd
	B06	242	B05	197- aaBBdd
	C12			197- aaBBdd
153	L10		L09	197- aaBBdd
	P04			197- aaBBdd
100	J18		J17	137 442244
153	L18			
	N18			
	G02			199 aabbdd
	F06			199 aabbdd
	G06			199 aaBBdd
	012			200- aabbdd
133	A02			200-aabbdd
152	A16			200-aabbdd
	B08			200-aabbdd
	F12			200- aabbdd
	P08		P07	200- AAbbdo
	M16		M15	
	102			201- aaBBdd
133				201- aaBBdd
152	022			202- aaBBdd
153	F20			217- aabbdd
152	H04			202-aaBBdd
153	H02			202- aaBBdd
4-0	G12	242		202- aaBBdd
153	004		003	203- aaBBdd
	F10	242		203- aabbdd
4-0	G24		G23	203- aaBBdd
153	L06	242		203- aaBBdd
	E22		E21	203- aaBBdd
	C04	240		204- aabbdd
	D08		D07	204- aabbdd
	F02	240	F01	205- aabbdd
	A20		A19	205- aabbdd
	112		l11	205- aabbdd
	A18	240	A17	206- aabbdd
	D02	240	D01	206- aabbdd
	J04	240		207- aabbdd
	A12	240	A11	207- aabbdd
	H12	240	H11	207- aabbdd
	114	240	I13	208- aabbdd
	A06	240	A05	208- aabbdd
	K08	240	K07	208- aabbdd
	D06	240	D05	208- aabbdd
	G20		G19	208- aabbdd
	D04	240	D03	209- aabbdd
	E04	240	E03	209- aabbdd

C20	240	C19		209- aabbdd
J02	240	J01		209- aabbdd
N10		N09		209- aabbdd
006	240	005		210- aabbdd
G04		G03		210- aabbdd
C02	240			211- aabbdd
C14	240			211 aabbdd
C18		C17		211- aabbdd
E02	240	E01		211- aabbdd
G18		G17		211- aabbdd
B02	240	B01		212- aabbdd
M04		M03		212- aabbdd
K04	240	K03		212- aabbdd
K18	240	K17		213- aabbdd
018	240	017		213- aabbdd
A24	240			213- aabbdd
J20	240			198- aaBBdd
E20	240			214- aabbdd
C16	240			214- aabbdd
116	240	l15		214- aabbdd
C22	240	C21		215- aabbdd
G16	240	G15		216- aabbdd
M02		M01		216- aabbdd
P06	240	DOF		216- aabbdd
	240	PUS		210- aannuu
F18	240	F17	281	210- ааррии
F18	240	F17	281 281	210- aabbuu
F18 H18		F17 H17	281 281	
F18 H18 E16	242	F17 H17 E15		218- aabbdd
F18 H18 E16 H10	242 242	F17 H17 E15 H09		218- aabbdd 218- aabbdd
F18 H18 E16 H10 A14	242 242 242	F17 H17 E15 H09 A13		218- aabbdd 218- aabbdd 218- aabbdd
F18 H18 E16 H10 A14 L20	242 242 242 242	F17 H17 E15 H09 A13 L19		218- aabbdd 218- aabbdd 218- aabbdd 198- aabbdd
F18 H18 E16 H10 A14 L20	242 242 242	F17 H17 E15 H09 A13 L19		218- aabbdd 218- aabbdd 218- aabbdd
F18 H18 E16 H10 A14 L20 I08	242 242 242 242	F17 H17 E15 H09 A13 L19		218- aabbdd 218- aabbdd 218- aabbdd 198- aabbdd
F18 H18 E16 H10 A14 L20 I08	242 242 242 242 242	F17 H17 E15 H09 A13 L19 I07		218- aabbdd 218- aabbdd 218- aabbdd 198- aabbdd 219- aabbdd
F18 H18 E16 H10 A14 L20 I08 I22 M24	242 242 242 242 242 242	F17 H17 E15 H09 A13 L19 I07 I21 M23		218- aabbdd 218- aabbdd 218- aabbdd 198- aabbdd 219- aabbdd 219- aabbdd
F18 H18 E16 H10 A14 L20 I08 I22 M24	242 242 242 242 242 242 242 242	F17 H17 E15 H09 A13 L19 I07 I21 M23 M07		218- aabbdd 218- aabbdd 218- aabbdd 198- aabbdd 219- aabbdd 219- aabbdd 220- aabbdd
F18 H18 E16 H10 A14 L20 I08 I22 M24 M08 I24	242 242 242 242 242 242 242 242 242	F17 H17 E15 H09 A13 L19 I07 I21 M23 M07 I23		218- aabbdd 218- aabbdd 218- aabbdd 198- aabbdd 219- aabbdd 219- aabbdd 220- aabbdd
F18 H18 E16 H10 A14 L20 I08 I22 M24 M08 I24 K16	242 242 242 242 242 242 242 242 242 242	F17 H17 E15 H09 A13 L19 I07 I21 M23 M07 I23 K15		218- aabbdd 218- aabbdd 218- aabbdd 198- aabbdd 219- aabbdd 220- aabbdd 220- aabbdd 220- aabbdd 220- aabbdd
F18 H18 E16 H10 A14 L20 I08 I22 M24 M08 I24 K16 M06	242 242 242 242 242 242 242 242 242 242	F17 H17 E15 H09 A13 L19 I07 I21 M23 M07 I23 K15 M05		218- aabbdd 218- aabbdd 218- aabbdd 198- aabbdd 219- aabbdd 220- aabbdd 220- aabbdd 220- aabbdd 220- aabbdd 220- aabbdd
F18 H18 E16 H10 A14 L20 I08 I22 M24 M08 I24 K16 M06 K06	242 242 242 242 242 242 242 242 242 242	F17 H17 E15 H09 A13 L19 I07 I21 M23 M07 I23 K15 M05 K05		218- aabbdd 218- aabbdd 218- aabbdd 198- aabbdd 219- aabbdd 220- aabbdd 220- aabbdd 220- aabbdd 220- aabbdd 221- aabbdd 221- aabbdd
F18 H18 E16 H10 A14 L20 I08 I22 M24 M08 I24 K16 M06 K06 E24	242 242 242 242 242 242 242 242 242 242	F17 H17 E15 H09 A13 L19 I07 I21 M23 M07 I23 K15 M05 K05 E23		218- aabbdd 218- aabbdd 218- aabbdd 198- aabbdd 219- aabbdd 220- aabbdd 220- aabbdd 220- aabbdd 220- aabbdd 221- aabbdd 221- aabbdd
F18 H18 E16 H10 A14 L20 I08 I22 M24 M08 I24 K16 M06 K06 E24 O20	242 242 242 242 242 242 242 242 242 242	F17 H17 E15 H09 A13 L19 I07 I21 M23 M07 I23 K15 M05 K05 E23 O19		218- aabbdd 218- aabbdd 218- aabbdd 198- aabbdd 219- aabbdd 220- aabbdd 220- aabbdd 220- aabbdd 221- aabbdd 221- aabbdd 221- aabbdd 221- aabbdd
F18 H18 E16 H10 A14 L20 I08 I22 M24 M08 I24 K16 M06 K06 E24 O20 M14	242 242 242 242 242 242 242 242 242 242	F17 H17 E15 H09 A13 L19 I07 I21 M23 M07 I23 K15 M05 K05 E23 O19 M13		218- aabbdd 218- aabbdd 198- aabbdd 219- aabbdd 219- aabbdd 220- aabbdd 220- aabbdd 220- aabbdd 221- aabbdd 221- aabbdd 221- aabbdd 221- aabbdd 221- aabbdd
F18 H18 E16 H10 A14 L20 I08 I22 M24 M08 I24 K16 M06 K06 E24 O20 M14 K12	242 242 242 242 242 242 242 242 242 242	F17 H17 E15 H09 A13 L19 I07 I21 M23 M07 I23 K15 M05 K05 E23 O19 M13 K11		218- aabbdd 218- aabbdd 218- aabbdd 198- aabbdd 219- aabbdd 220- aabbdd 220- aabbdd 220- aabbdd 221- aabbdd
F18 H18 E16 H10 A14 L20 I08 I22 M24 M08 I24 K16 M06 K06 E24 O20 M14 K12	242 242 242 242 242 242 242 242 242 242	F17 H17 E15 H09 A13 L19 I07 I21 M23 M07 I23 K15 M05 K05 E23 O19 M13 K11		218- aabbdd 218- aabbdd 198- aabbdd 219- aabbdd 219- aabbdd 220- aabbdd 220- aabbdd 220- aabbdd 221- aabbdd 221- aabbdd 221- aabbdd 221- aabbdd 221- aabbdd
F18 H18 E16 H10 A14 L20 I08 I22 M24 M08 I24 K16 M06 E24 O20 M14 K12 E14	242 242 242 242 242 242 242 242 242 242	F17 H17 E15 H09 A13 L19 I07 I21 M23 M07 I23 K15 M05 K05 E23 O19 M13 K11		218- aabbdd 218- aabbdd 218- aabbdd 198- aabbdd 219- aabbdd 220- aabbdd 220- aabbdd 220- aabbdd 221- aabbdd
F18 H18 E16 H10 A14 L20 I08 I22 M24 M08 I24 K16 M06 E24 O20 M14 K12 E14 M12	242 242 242 242 242 242 242 242 242 242	F17 H17 E15 H09 A13 L19 I07 I21 M23 M07 I23 K15 M05 K05 E23 O19 M13 K11 E13 M11		218- aabbdd 218- aabbdd 218- aabbdd 198- aabbdd 219- aabbdd 219- aabbdd 220- aabbdd 220- aabbdd 221- aabbdd
F18 H18 E16 H10 A14 L20 I08 I22 M24 M08 I24 K16 M06 E24 O20 M14 K12 E14 M12 A22	242 242 242 242 242 242 242 242 242 242	F17 H17 E15 H09 A13 L19 I07 I21 M23 M07 I23 K15 M05 K05 E23 O19 M13 K11 E13 M11		218- aabbdd 218- aabbdd 198- aabbdd 219- aabbdd 219- aabbdd 220- aabbdd 220- aabbdd 220- aabbdd 221- aabbdd
F18 H18 E16 H10 A14 L20 I08 I22 M24 M08 I24 K16 M06 E24 O20 M14 K12 E14 M12 A22	242 242 242 242 242 242 242 242 242 242	F17 H17 E15 H09 A13 L19 I07 I21 M23 M07 I23 K15 M05 K05 E23 O19 M13 K11 E13 M11 A21 F07		218- aabbdd 218- aabbdd 218- aabbdd 198- aabbdd 219- aabbdd 219- aabbdd 220- aabbdd 220- aabbdd 221- aabbdd

J10	COO	C21		224 aabbala
P20 242 P19 184 aabbdd G10 242 G09 224 aabbdd C06 242 C05 225 aabbdd A08 242 A07 225 aabbdd 153 E10 242 E09 225 aabbdd K10 242 K09 225 aabbdd L04 242 L03 225 aabbdd N06 242 K23 226 aabbdd N06 242 N05 226 aabbdd 153 J08 242 J07 227 aabbdd 153 G14 242 G13 227 aabbdd 153 P02 242 P01 281 B1 281 153 P02 242 P01 <td< td=""><td>G22</td><td>G21</td><td></td><td>224- aabbdd</td></td<>	G22	G21		224- aabbdd
G10 242 G09 224 aabbdd C06 242 C05 225 aabbdd A08 242 A07 225 aabbdd 153 E10 242 E09 225 aabbdd K10 242 K09 225 aabbdd L04 242 L03 225 aabbdd K24 242 K23 226 aabbdd N06 242 N05 226 aabbdd 153 J08 242 J07 227 aabbdd 153 P02 242 P01 281 227 aabbdd 153 R06 242 P01 281 227 aabbdd 153 H06 242 H05 227 aabbdd 153 H06 242 H05 227 aabbdd B14 B13 ams aabbdd B14 B13 ams aabbdd B14 F13 ams aabbdd B14 H13 ams aabbdd B16 B15 br32 aabbD_ B16 B15 br32 aabbd B14 L13 281 expr aabbdd B14 L14 242 J13 expr aabbdd B14 L14 242 J13 expr aabbdd B15 <td></td> <td></td> <td></td> <td></td>				
CO6 242 CO5 225-aabbdd A08 242 A07 225-aabbdd 153 E10 242 E09 225-aabbdd K10 242 K09 225-aabbdd L04 242 L03 225-aabbdd K24 242 K23 226-aabbdd N06 242 N05 226-aabbdd 153 J08 242 J07 227-aabbdd 153 R02 242 G13 227-aabbdd 153 R02 242 P01 281 227-aabbdd 153 R02 242 H05 227-aabbdd 153 R06 242 H05 227-aabbdd 154 R14 R13 ams aabbdd B14 R13 ams aabbdd B14 R13 ams aabbdd B14 R13 ams aabbdd B16 R15 br32 aabbD_ D16 P15 br32 aabbd B14 P14 P13 expr aabbdd B14 P14 P15 P16 pr32 aabbd B15 P17	_			
A08				
153 E10 242 E09 225-aabbdd K10 242 K09 225-aabbdd L04 242 L03 225-aabbdd K24 242 K23 226-aabbdd N06 242 N05 226-aabbdd 153 J08 242 J07 227-aabbdd 153 G14 242 G13 227-aabbdd 153 P02 242 P01 281 227-aabbdd 153 H06 242 H05 227-aabbdd B14 B13 ams aabbdd B14 B13 ams aabbdd B14 B13 ams aabbdd B14 F13 ams aabbdd B14 H13 ams aabbdd B14 H13 ams aabbdd B16 B15 br32 aabbD_ B16 B15 br32 aabbd_ B14 242 J13 expr aabbdd B14 242 J13 expr aabbdd B14 242 J13 281 expr aabbdd B14 242 J13 281 185-aabbdd B14 242 J12 214-aabbdd B22 B21 Blan aabbdd </td <td></td> <td>242 C05</td> <td></td> <td></td>		242 C05		
K10 242 K09 225- aabbdd L04 242 L03 225- aabbdd K24 242 K23 226- aabbdd N06 242 N05 226- aabbdd 153 J08 242 J07 227- aabbdd 153 G14 242 G13 227- aabbdd 153 P02 242 P01 281 227- aabbdd 153 H06 242 H05 227- aabbdd B14 B13 ams aabbdd B14 B13 ams aabbdd B14 B13 ams aabbdd B14 B13 ams aabbdd B14 H13 ams aabbdd B14 H13 ams aabbdd B16 B15 br32 aabbD_ D16 D15 br32 aabbd J14 242 J13 expr aabbdd L14 242 J13 expr aabbdd N14 242 N13 sola aabbdd N14 242 J13 281 expr aabbdd N14 242 J21 281 185- aabbdd B22 B21 Blan aabbdd 194- aaBBdd B24 B23	80A	242 A07		225- aabbdd
LO4 242 LO3 225-aabbdd K24 242 K23 226-aabbdd N06 242 N05 226-aabbdd 153 J08 242 J07 227-aabbdd 153 G14 242 G13 227-aabbdd 153 PO2 242 PO1 281 227-aabbdd 153 H06 242 H05 227-aabbdd B14 B13 ams aabbdd B14 B13 ams aabbdd B14 F13 ams aabbdd B14 F13 ams aabbdd B14 F13 ams aabbdd B14 H13 ams aabbdd B16 B15 br32 aabbD B16 B15 br32 aabbd B16 B15 br32 aabbdd B14 242 J13 expr aabbdd B14 242 J13 expr aabbdd B14 242 J13 expr aabbdd B14 242 J13 281 185-aabbdd B15 242 B1 185-aabbdd 182-aabbdd B15 B21 B14-aabbdd 182-aabbdd 182-aabbdd 182-aabbdd	153 E10	242 E09		225- aabbdd
K24 242 K23 226- aabbdd N06 242 N05 226- aabbdd 153 J08 242 J07 227- aabbdd 153 G14 242 G13 227- aabbdd 153 P02 242 P01 281 227- aabbdd 153 H06 242 H05 227- aabbdd B14 B13 ams aabbdd B14 B13 ams aabbdd B14 F13 ams aabbdd B14 H13 ams aabbdd B16 B15 br32 aabbD_ D16 D15 br32 aabbdD_ F16 F15 br32 aabbdd J14 242 J13 expr aabbdd L14 242 J13 expr aabbdd N14 242 N13 sola aabbdd D22 242 D21 281 185- aabbdd H22 242 H21 281 194- aaBBdd J22 242 J21 214- aabbdd J22 242 J21 218- aabbdd B24 B23 Volt AAbbdd D24 D23 281 Nori ???? H16 H15	K10	242 K09		225- aabbdd
N06 242 N05 226-aabbdd 153 J08 242 J07 227-aabbdd 153 G14 242 G13 227-aabbdd 153 P02 242 P01 281 227-aabbdd 153 C24 242 C23 227-aabbdd 153 H06 242 H05 227-aabbdd B14 B13 ams aabbdd B14 B13 ams aabbdd B14 F13 ams aabbdd F14 F13 ams aabbdd F14 F13 Blan aabbdd B16 B15 br32 aabbD_ D16 D15 br32 aabbdd J14 242 J13 expr aabbdd L14 242 J13 expr aabbdd N14 242 N13 sola aabbdd D22 242 D21 281 185- aabbdd J22 242 J21 214- aabbdd J24 B23 Volt AAbbdd	L04	242 L03		225- aabbdd
153 J08 242 J07 227- aabbdd 153 G14 242 G13 227- aabbdd 153 P02 242 P01 281 227- aabbdd 153 C24 242 C23 227- aabbdd 153 H06 242 H05 227- aabbdd B14 B13 ams aabbdd B14 B13 ams aabbdd B14 F13 ams aabbdd H14 F13 ams aabbdd H14 H13 ams aabbdd B16 B15 br32 aabbD_ D16 D15 br32 aabbd_ J14 242 J13 expr aabbdd L14 242 L13 281 expr aabbdd N14 242 N13 sola aabbdd sola aabbdd N22 242 D21 281 185- aabbdd H22 242 H21 281 194- aaBBdd H22 242 L21 218- aabbdd B24 B23 Volt AAbbdd D24 D23 281 Volt AAbbdd F22 F21 202- aaBBdd H24 H23 Nori ???? <tr< td=""><td>K24</td><td>242 K23</td><td></td><td>226- aabbdd</td></tr<>	K24	242 K23		226- aabbdd
153 G14 242 G13 227- aabbdd 153 P02 242 P01 281 227- aabbdd 153 C24 242 C23 227- aabbdd 153 H06 242 H05 227- aabbdd B14 B13 ams aabbdd B14 F13 ams aabbdd F14 F13 ams aabbdd F14 F13 ams aabbdd H14 H13 ams aabbdd B16 B15 br32 aabbD_ D16 D15 br32 aabbdD_ F16 F15 br32 aabbdd J14 242 J13 expr aabbdd L14 242 L13 281 expr aabbdd N14 242 N13 sola aabbdd sola aabbdd N22 242 D21 281 185- aabbdd H22 242 H21 281 194- aaBBdd J22 242 L21 218- aabbdd B24 B23 Volt AAbbdd D24 D23 281 volt AAbbdd F22 F21 202- aaBBdd F24 F23 281 Nori ???? <	N06	242 N05		226- aabbdd
153 PO2 242 PO1 281 227- aabbdd 153 C24 242 C23 227- aabbdd 153 HO6 242 HO5 227- aabbdd B14 B13 ams aabbdd B14 D13 ams aabbdd F14 F13 ams aabbdd H14 H13 ams aabbdd H14 H13 ams aabbdd B16 B15 br32 aabbD_ D16 D15 br32 aabbd_ J14 242 J13 expr aabbdd J14 242 J13 expr aabbdd N14 242 J13 expr aabbdd N14 242 N13 sola aabbdd D22 242 D21 281 185- aabbdd H22 242 H21 281 194- aaBBdd J22 242 J21 214- aabbdd B22 B21 Blan aabbdd B24 B23 Volt AAbbdd B24 B23 Volt AAbbdd F22 F21 202- aaBBdd F24 F23 281 Nori ???? H16 H15 holli aa	153 J08	242 J07		227- aabbdd
153 C24 242 C23 227- aabbdd 153 H06 242 H05 227- aabbdd B14 B13 ams aabbdd D14 D13 ams aabbdd F14 F13 ams aabbdd H14 H13 ams aabbdd H14 H13 ams aabbdd B16 B15 br32 aabbD_ D16 D15 br32 aabbdD_ F16 F15 br32 aabbdd J14 242 J13 expr aabbdd L14 242 L13 281 expr aabbdd N14 242 N13 sola aabbdd N22 242 D21 281 185- aabbdd H22 242 H21 281 194- aaBBdd H22 242 J21 214- aabbdd B22 B21 Blan aabbdd B24 B23 Volt AAbbdd B24 B23 Volt AAbbdd B24 F23 281 Nori ???? H16 H15 holli aaBBdd H24 H23 Nori ???? J12 J11 holli aaBbdd	153 G14	242 G13		227- aabbdd
153 H06 242 H05 227- aabbdd B14 B13 ams aabbdd D14 D13 ams aabbdd F14 F13 ams aabbdd H14 H13 ams aabbdd P14 240 P13 Blan aabbdd B16 B15 br32 aabbD_ D16 D15 br32 aabbd_ F16 F15 br32 aabbdd J14 242 J13 expr aabbdd L14 242 J13 expr aabbdd N14 242 N13 sola aabbdd D22 242 D21 281 185- aabbdd H22 242 H21 281 194- aaBBdd J22 242 J21 214- aabbdd B22 B21 Blan aabbdd B24 B23 Volt AAbbdd B24 B23 Volt AAbbdd B24 B23 Volt AAbbdd F24 F23 281 Nori ???? H16 H15 holli aaBBdd H24 H23 Nori ???? J12 J11 J16 J15 <	153 P02	242 P01	281	227- aabbdd
B14 B13 ams aabbdd D14 D13 ams aabbdd F14 F13 ams aabbdd H14 H13 ams aabbdd P14 240 P13 Blan aabbdd B16 B15 br32 aabbD_ D16 D15 br32 aabbd_ F16 F15 br32 aabbdd J14 242 J13 expr aabbdd L14 242 L13 281 expr aabbdd N14 242 N13 sola aabbdd sola aabbdd N14 242 N13 sola aabbdd sola aabbdd N22 242 D21 281 185- aabbdd H22 242 J21 214- aabbdd J22 242 J21 218- aabbdd B24 B23 Volt AAbbdd B24 B23 Volt AAbbdd F22 F21 202- aaBBdd F24 F23 281 Nori ???? J12 J11 holli aaBBdd J24 J23 orcf aabbdd	153 C24	242 C23		227- aabbdd
D14	153 H06	242 H05		227- aabbdd
F14 F13 ams aabbdd H14 H13 ams aabbdd P14 240 P13 Blan aabbdd B16 B15 br32 aabbD_ D16 D15 br32 AAbbD_ F16 F15 br32 aabbdd J14 242 J13 expr aabbdd L14 242 L13 281 expr aabbdd N14 242 N13 sola aabbdd D22 242 D21 281 185- aabbdd H22 242 H21 281 194- aaBBdd J22 242 J21 214- aabbdd B22 B21 Blan aabbdd B24 B23 Volt AAbbdd B24 B23 Volt AAbbdd F22 F21 202- aaBBdd F24 F23 281 Nori ???? H16 H15 holli aaBBdd H24 H23 Nori ???? J12 J11 J16 J15 holli aaBBdd J24 J23 orcf aabbdd L12 L11 L16 L15 L24 L23 orcf aabbdd N12 N11 N16 N15	B14	B13		ams aabbdd
H14 H13 ams aabbdd P14 240 P13 Blan aabbdd B16 B15 br32 aabbD_ D16 D15 br32 AAbbD_ F16 F15 br32 aabbdd J14 242 J13 expr aabbdd N14 242 N13 sola aabbdd N14 242 N13 sola aabbdd D22 242 D21 281 185- aabbdd H22 242 H21 281 194- aaBBdd J22 242 J21 214- aabbdd B22 B21 Blan aabbdd B24 B23 Volt AAbbdd D24 D23 281 volt AAbbdd F24 F23 281 Nori ???? H16 H15 holli aaBBdd H24 H23 Nori ???? J12 J11 J16 J15 holli aaBBdd J24 J23 orcf aabbdd N12 N11 N16 N15	D14	D13		ams aabbdd
P14 240 P13 Blan aabbdd B16 B15 br32 aabbD_ D16 D15 br32 AAbbD_ F16 F15 br32 aabbdd J14 242 J13 expr aabbdd L14 242 L13 281 expr aabbdd N14 242 N13 sola aabbdd D22 242 D21 281 185- aabbdd H22 242 H21 281 194- aaBBdd J22 242 J21 218- aabbdd J22 242 L21 218- aabbdd B22 B21 Blan aabbdd B24 B23 Volt AAbbdd B24 B23 Volt AAbbdd F22 F21 202- aaBBdd F24 F23 281 Nori ???? H16 H15 holli aaBBdd H24 H23 Nori ???? J12 J11 J16 J15 J16 J15 holli aaBbdd J24 J23 orcf aabbdd L12	F14	F13		ams aabbdd
B16 B15 br32 aabbD_ D16 D15 br32 AAbbD_ F16 F15 br32 aabbdd J14 242 J13 expr aabbdd L14 242 L13 281 expr aabbdd N14 242 N13 sola aabbdd D22 242 D21 281 185- aabbdd H22 242 H21 281 194- aaBBdd J22 242 J21 214- aabbdd J22 242 J21 218- aabbdd B22 B21 Blan aabbdd B24 B23 Volt AAbbdd D24 D23 281 volt AAbbdd F22 F21 202- aaBBdd F24 F23 281 Nori ???? H16 H15 holli aaBBdd H24 H23 Nori ???? J12 J11 J16 J15 J24 J23 orcf aabbdd L12 L11 L16 L15 L24 L23 orcf aabbdd N12 N11 N15	H14	H13		ams aabbdd
D16	P14	240 P13		Blan aabbdd
D16	B16	B15		br32aabbD
F16 F15 br32 aabbdd J14 242 J13 expr aabbdd L14 242 L13 281 expr aabbdd N14 242 N13 sola aabbdd D22 242 D21 281 185- aabbdd H22 242 H21 281 194- aaBBdd J22 242 J21 214- aabbdd B22 B21 Blan aabbdd B24 B23 Volt AAbbdd D24 D23 281 volt AAbbdd F22 F21 202- aaBBdd F24 F23 281 Nori ???? H16 H15 holli aaBBdd H24 H23 Nori ???? J12 J11 J16 J15 holli aaBBdd J24 J23 orcf aabbdd L12 L11 L16 L15 L24 L23 orcf aabbdd N12 N11 N16 N15				_
J14 242 J13 expr aabbdd L14 242 L13 281 expr aabbdd N14 242 N13 sola aabbdd D22 242 D21 281 185- aabbdd H22 242 H21 281 194- aaBBdd J22 242 J21 214- aabbdd I55 L22 242 L21 218- aabbdd B22 B21 Blan aabbdd B24 B23 Volt AAbbdd D24 D23 281 volt AAbbdd F22 F21 202- aaBBdd F24 F23 281 Nori ????? H16 H15 holli aaBBdd H24 H23 Nori ???? J12 J11 J16 J15 J24 J23 orcf aabbdd L12 L11 L16 L15 L24 L23 orcf aabbdd N12 N11 N16 N15				_
L14 242 L13 281 expr aabbdd N14 242 N13 sola aabbdd D22 242 D21 281 185- aabbdd H22 242 H21 281 194- aaBBdd J22 242 L21 218- aabbdd B22 B21 Blan aabbdd B24 B23 Volt AAbbdd D24 D23 281 volt AAbbdd F22 F21 202- aaBBdd F24 F23 281 Nori ???? H16 H15 holli aaBBdd H24 H23 Nori ???? H16 H24 H23 Nori ???? J12 J11 J16 J15 holli aaBBdd J24 J23 orcf aabbdd L12 L11 L16 L15 L24 L23 orcf aabbdd N12 N11 N16 N15				
N14 242 N13 sola aabbdd D22 242 D21 281 185- aabbdd H22 242 H21 281 194- aaBBdd J22 242 J21 214- aabbdd 155 L22 242 L21 218- aabbdd B22 B21 Blan aabbdd B24 B23 Volt AAbbdd D24 D23 281 volt AAbbdd F22 F21 202- aaBBdd F24 F23 281 Nori ???? H16 H15 holli aaBBdd H24 H23 Nori ???? J12 J11 holli aaBBdd J24 J23 orcf aabbdd L12 L11 L16 L15 L24 L23 orcf aabbdd N12 N11 N16 N15			281	•
D22 242 D21 281 185- aabbdd H22 242 H21 281 194- aaBBdd J22 242 J21 214- aabbdd 155 L22 242 L21 218- aabbdd B22 B21 Blan aabbdd Volt AAbbdd D24 D23 281 volt AAbbdd F22 F21 202- aaBBdd F24 F23 281 Nori ???? H16 H15 holli aaBBdd H24 H23 Nori ???? J12 J11 J16 J15 holli aaBBdd J24 J23 orcf aabbdd L12 L11 L16 L15 L24 L23 orcf aabbdd N12 N11 N16 N15		_		•
H22 242 H21 281 194-aaBBdd J22 242 J21 214-aabbdd 155 L22 242 L21 218-aabbdd B22 B21 Blan aabbdd B24 B23 Volt AAbbdd D24 D23 281 volt AAbbdd F22 F21 202-aaBBdd F24 F23 281 Nori ???? H16 H15 holli aaBBdd H24 H23 Nori ???? J12 J11 J16 J15 holli aaBBdd J24 J23 orcf aabbdd L12 L11 L16 L15 L24 L23 orcf aabbdd N12 N11 N15			281	
J22 242 J21 214- aabbdd 155 L22 242 L21 218- aabbdd B22 B21 Blan aabbdd B24 B23 Volt AAbbdd D24 D23 281 volt AAbbdd F22 F21 202- aaBBdd F24 F23 281 Nori ???? H16 H15 holli aaBBdd H24 H23 Nori ???? J12 J11 J16 J15 holli aaBBdd J24 J23 orcf aabbdd L12 L11 L16 L15 L24 L23 orcf aabbdd N12 N11 N16 N15				
155 L22 242 L21 218- aabbdd B22 B21 Blan aabbdd B24 B23 Volt AAbbdd D24 D23 281 volt AAbbdd F22 F21 202- aaBBdd F24 F23 281 Nori ???? H16 H15 holli aaBBdd H24 H23 Nori ???? J12 J11 J16 J24 J23 orcf aabbdd L12 L11 L16 L15 L24 L23 orcf aabbdd N12 N11 N15			201	
B22 B21 Blan aabbdd B24 B23 Volt AAbbdd D24 D23 281 volt AAbbdd F22 F21 202- aaBBdd F24 F23 281 Nori ???? H16 H15 holli aaBBdd H24 H23 Nori ???? J12 J11 J16 J15 holli aaBBdd J24 J23 orcf aabbdd L12 L11 L16 L15 L24 L23 orcf aabbdd N12 N11 N15				
B24 B23 Volt AAbbdd D24 D23 281 volt AAbbdd F22 F21 202- aaBBdd F24 F23 281 Nori ???? H16 H15 holli aaBBdd H24 H23 Nori ???? J12 J11 J15 holli aaBBdd J24 J23 orcf aabbdd L12 L11 L16 L15 L24 L23 orcf aabbdd N12 N11 N15				
D24 D23 281 volt AAbbdd F22 F21 202-aaBBdd F24 F23 281 Nori ???? H16 H15 holli aaBBdd H24 H23 Nori ???? J12 J11 J16 J15 holli aaBBdd J24 J23 orcf aabbdd L12 L11 L16 L15 L24 L23 orcf aabbdd N12 N11 N15				
F22 F21 202-aaBBdd F24 F23 281 Nori ???? H16 H15 holli aaBBdd H24 H23 Nori ???? J12 J11 J16 J15 holli aaBBdd J24 J23 orcf aabbdd L12 L11 L16 L15 L24 L23 orcf aabbdd N12 N11 N15			201	
F24 F23 281 Nori ???? H16 H15 holli aaBBdd H24 H23 Nori ???? J12 J11 J16 J15 holli aaBBdd J24 J23 orcf aabbdd L12 L11 L16 L15 L24 L23 orcf aabbdd N12 N11 N15			201	
H16 H15 holli aaBBdd H24 H23 Nori ???? J12 J11 J16 J15 holli aaBBdd J24 J23 orcf aabbdd L12 L11 L16 L15 L24 L23 orcf aabbdd N12 N11 N16 N15			201	
H24 H23 Nori ???? J12 J11 J16 J15 holli aaBBdd J24 J23 orcf aabbdd L12 L11 L16 L15 L24 L23 orcf aabbdd N12 N11 N16 N15			201	
J12 J11 J16 J15 holli aaBBdd J24 J23 orcf aabbdd L12 L11 L16 L15 L24 L23 orcf aabbdd N12 N11 N16 N15				
J16 J15 holli aaBBdd J24 J23 orcf aabbdd L12 L11 L16 L15 L24 L23 orcf aabbdd N12 N11 N16 N15				Nori ????
J24 J23 orcf aabbdd L12 L11 L16 L15 L24 L23 orcf aabbdd N12 N11 N16 N15				le all' a ann da
L12 L11 L16 L15 L24 L23 orcf aabbdd N12 N11 N16 N15				
L16 L15 L24 L23 orcf aabbdd N12 N11 N16 N15				orct aabbdd
L24 L23 orcf aabbdd N12 N11 N16 N15				
N12 N11 N16 N15				
N16 N15				orct aabbdd
N22 N21 182(aabbdd				
	N22	N21		182(aabbdd

N24	N23	Farn aabbD_
P12	P11	
P16	P15	
P22	P21	224- aabbdd
P24	P23	Farn aabbD

Marker	BR DNA	AMS	BR field		expre	ess	expresso	solano	Blanca gran	nde
wmc128	230	230		230	:	230	237	230		230
gwm400	158, 165	158	153, 155,	165	:	153	153	153		155
barc49	226	226	226, 238		2	238	238	226		238
gdm99	151-157, 153	153	151-157,	153	:	153	153	151-157	149-153	
gdm127	207, 208	207, 208		208	7	208	208	208		207
barc83	292, 295	292, 295		292	:	292	292	292		292
barc343	165, 173	173	165, 173		:	173	173	173		165
barc76	222, 240, <mark>234</mark>	222, 234		222	:	222	222	234		234
barc358	198, 204, 212	198, 212	198, 204		:	198	198	198		215
wmc419	163, 165, <mark>169</mark>	165	163, 169			163	165	173		165
wms413	106, 108	106, 108		108	:	108	113	106		108
barc184	212 , 215, 23 4	212, 234		234	;	234	234	215		234
gwm52	165, <mark>167</mark> , 170	165, 170		167	:	170	170	170		167
barc222	207	207		207	:	207	207	207		195
gwm155	165, 167	167	165, 167		:	167	167	167		167
wmc59	217, 223	223	217, 223		:	223	223	223		223
gwm570	159, 161	DNA		161	161,	163	161	163		163
gwm325	157, 159	DNA		159	:	157	157	157		159
wmc169	152, 181, <mark>183</mark>	DNA		183	:	152	152	155		155
wmc332	<mark>217</mark> , 221, 224	DNA	DNA		:	221	221	224		221
wmc25	188, 192	DNA	DNA			192	192	192		
wmc428	279, <mark>281, 28</mark> 5	DNA	DNA		:	279	279	285		279
wmc553	170, <mark>172</mark> , 174	DNA	DNA		:	174	174	174		174
wmc361	239, 243	DNA	DNA		;	243	###	241		245
gwm624	147, 150	DNA	DNA		:	147	147	147		145
barc127	217, 219, 221	DNA	DNA		:	221	221	217		217
barc71	116 , 124 , 133	DNA	DNA		:	133	133	124		133
barc356	216, 221	DNA	DNA		2	221	221	216		216
gwm130	146, 142	DNA	DNA			142	142	146		146
wmc416	240, 242	DNA	DNA		:	242	242	242		240
			count exa	act		19	21	17		
			count pre	sent		28	26	23		
			% exact		0.63	333	0.7	0.5667		
			% presen	t	0.93	333	0.866667	0.7667		

Espresso R V W Express

238 153

222,234 198, 204, 212

163 163

113

165, 170 170

152, 181152217, 221217, 221188,192192279, 285279164, 170, 174174239, 243239,243

sort	Plate 96 we	Sample	Class	gwm gwm	gwm g	gwm b	oarc;	gwm gwm	gwm	wmc	wmc:	384 ı	barcl barcl
1	1 A01	Above	HRW	168	159			170	171	242	279	A01	295
2	1 A02	Agawan	HWS	152	153		207	167		242	279	A03	292
3	1 A03	Alpowa	SWS	163	159		202	167	167	240		A05	295
4	1 A04	Alsen	HRS	161	161		205	167	167	240	279	A07	292
5	1 A05	Alturas	SWS	161	153		207	167		240		A09	292
6	1 A06	Amigo	HRW	161	157		205	167	171	240	265	A11	292
7	1 A07	Antelope	HWW		155		202	165	171	240		A13	292
8	1 A08	Anza	HRS	161	159		205	170	148	240	285	A15	292
9	1 A09	Avocet	SWS									A17	295
10	1 A10	Avocet_Yr15	SWS		159		202	167	148	240	279	A19	292
11		Avocet_Yr5	SWS		159		207	167			279		292
12		Above	HRW	168	159		207	170			279		292
13		Beamer	SWW	152	155		205	165		249	281		279
14		Big_Club	SPRING	165	159		196		167		279		279
15		Bill_Brown	HRW	163	157			165			279		279
16		Blanca	SWS	169	153		205				281		292
17		Blanca_Grande	HWS	163	159		196				279		292
18		Blanca_Royale	HWS	163	159			165			279		292
19		Bliss	SWS	161	163			165			281		279
20		Blizzard	HRW	152	165		205	167			281		292
21		Bond_CL	HRW	168	159			165			281		292
22		Bonneville	HRW	152	161		205				281		279
23		Boundary	HRW				209				279		
24		Beamer	SWW	152	155			165			281		279
25		Brundage	SWW	165	161		205				281		279
26		Brundage 96	SWW	165	161			165			281		279
27		Buchanan	HRW	159	159		205				275		279
28		Buck_Pronto	HRS	165	161		205				285		292
29	1 CO5	BZ904-331WP	HRS	165	159		207205				279281		292
30 31	1 C06 1 C07	Caledonia	HRS SWW	163 165	159			167		240		E11	292 292
32		Caledonia Centennial	SWS	161	159		207	167			285		292
33		Challis	SWS	161	153		207		167	240	279		292
34		Choteau	HRS	169	170			170		240		E17	279
35	1 C10 1 C11	Chukar	SWW	152	165			170			279		292
36		Brundage	SWW	165	103		207	165	107		281		279
37		Claire	SRW	159	159		209	172	165		281		
38		Clearfirst_(Mads		165	155			165		249			279
39		Conan	HRS	100	161			170			281		
40		Copper	HRS	165	161		202	170	103		291		
41		Cordiale	HRW		155			167			281		
42		Crestone	SWS	163	159		202	170	167		279		
43		Daws	SWW	159	159			170		240			295
44		Declo	HRW	156	161			167			279		
45		Deloris	HRW	159	159		-	165			276		
46		Desert_King	DURUM		-		196			240			282
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47	1 D11	Dirkwin	SWS					207			167		281	G21	292	
48	1 D12	Claire	SRW					207				240		G23	292	
49	1 E01	Dumas	HRW	152		157		207	167		165	240	285	101	279	
50	1 E02	Eddy	HRW	168		153		196	167		165	240	281	103	282	
51	1 E03	Eden	SWS	163		153		207	170		169	240	281	105	292	293
52	1 E04	Edwall	SWS	163		153		202	167	170	167	240	281	107	295	
53	1 E05	Ernest	HRS			153	161	196	167		167	240	281	109	282	
54	1 E06	Ernie	SRW	161		159		202	172		169	240		111	292	
55	1 E07	Estanzula_Fedral	HRS	165		159		205	170		167	240	291	l13	292	
56	1 E08	Explorer	HWS	161		153	157	205	167		148	249	279	l15	279	
57	1 E09	Express	HRS	161	163	157		207	170		167	243	279	117	292	
58	1 E10	Expresso	HRS	161		157		207	170			243		119	292	
59	1 E11	Federation	SWS	152		161		205				240	283	121	292	
60	1 E12	Dumas	HRW					207	167		169		285	123	279	
61	1 F01	Fieldwin	SWS	161		163		205	165		167	240	281	K01	295	
62	1 F02	Finch	SWW	165				204	165		167	240	279	K03	279	
63	1 F03	Finely	HRW	163		157		205			167	242	276	K05	282	
64	1 F04	Foote	SWW	161		159		202				240			292	
65	1 F05	Fortuna	HRS	163		153		196	161			240			279	
66	1 F06	Foster	SRW	169		159		207				240			282	
67	1 F07	Freyr	HRS			159		199			167			K13	292	
68	1 F08	Gala	HRS	161				196			167			K15	282	
69	1 F09	Garland	HRW			159		207				240	281		279	
70	1 F10	Gary	HWW	159		161		202			167	240			292	
71	1 F11	Gene	SWW					207					283		292	
72	1 F12	Fieldwin	SWS					202			167			K23	295	
73	1 G01	Gluyas	HWS	168		161		196					280	M01		
74	1 G02	Goetze	SWW	161		159		207						M03		
75	1 G03	Golden_Spike	HWW	159		161			167					M05		
76	1 G04	Grandin*5/ND61		133		161		207						M07		
77	1 G05	Hank	HRS	165		161		207						M09		
78	1 G05	Hartdog	HWS	161		157		202						M11		
79	1 G07	Hatcher	HRW	155		157		207						M13		
80	1 G07	Hermann	SRW	159		161		202						M15		
81	1 G00	Heyne	HWW	156		101		202	170					M17		
82	1 G10	Hill_81	SWW	165		155		202						M19		
83	1 G10 1 G11	Hollis	HRS	163		161		205						M21		
84	1 G11 1 G12	Gluyas	HWS	168		161		196						M23		
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85 86	1 H01	Hyslop	SWW	159		155		205					280	001		
86	1 H02	IDO444	HRW	152		165		207				240	202	003		
87	1 H03	Iona	HRS	161		159		196						005		
88	1 H04	Isreal_493_(stb3)		161		161		202						007		
89	1 H05	Jagger	HRW	161		159		209				240		009		
90	1 H06	Jaypee	SRW	150		159		196			169	242	268	011		
91	1 H07	Jerome 	HRS	165				4	167			240		013		
92	1 H08	Joaquin	HRS			4		196						015		
93	1 H09	Jubilee	SWS	161		153		207	167		167	240	279	017	292	

0.4	4 1140	Maria	LINAG	162	150		100	4.67	474	242	010	202	
94	1 H10	Klasic	HWS	163	159			167		242		292	
95 06	1 H11	Knudson	HRS	161	170			172	148		281 021		
96 07	1 H12	Hyslop	SWW	159	155			165	167		279 O23		
97	2 A01	Lambert	SWW	159	159			172			281 B01		
98	2 A02	Lassik	HRS	161	159			170			285 B03		
99	2 A03	Lolo	HWS	169	159			167			279 B05		
100	2 A04	Luke	SWW	155	157			167			276 B07		
101	2 A05	Macon	HWS	161	161			170	1/1		281 B09		
102	2 A06	MacVicar	SWW	159	159			170	467		281 B11		
103	2 A07	Madsen	SWW	159	159			170			280 B13		
104	2 A08	Malcom	SWW	159	159			170	167		281 B15		
105	2 A09	Manning	HRW	159	161			167			279 B17		
106	2 A10	Marquis	HRS	161	170		205	170			281 B19		
107	2 A11	Masami	SWW	165	155			165			276 B21		
108	2 A12	Lambert	SWW	159	159			172			281 B23		
109	2 B01	McNeal	HRS	161		161	196				281 D01		
110	2 B02	MDM	HWW	165	155			165			276 D03		
111	2 B03	MEL_(Coda)_clu		165	165			172			279 D05		
112	2 B04	Mien11	HRS	161	165			170	165		285 D07		
113	2 B05	Mien182	HWS	161	159			170			283 D09		
114	2 B06	Mohler	SWW	165	155		202	165			281 D11		
115	2 B07	Moreland	HRW	161	153			167			279 D13		
116	2 B08	MSU_Line_E100		155	153			167			279 D15		
117	2 B09	MT000414	HRS		161			167			281 D17		
118	2 B10	MT000415	HRS		161			167	167		281 D19		
119	2 B11	MT000515	HRS					167			281 D21		
120	2 B12	McNeal	HRS	161		161	196			240	D23		
121	2 CO1	Neeley	HRW	161	161			167			279 F01		
122	2 CO2	Nick	SWS	161	153			161			284 F03		293
123	2 C03	Norpro	HRS	163	153			172			281 F05		
124	2 CO4	NuFrontier	HWW	161	153			167			265 F07		
125	2 C05	NuHills	HWW	163	159			170		240	F09		
126	2 C06	NuHorizon	HWW	161	153			167			265 F11		
127	2 C07	NuPlains	HWW	161	170			161			281 F13		
128	2 C08	NY18/cc_40-1	SWW	163	161			172			281 F15		
129	2 C09	NY88046-8138	SWW	159	155			172			276 F17		
130	2 C10	OS9	SWW	152	159			165		240	281 F19		
131	2 C11	Outlook	HRS	161	157			167	169		F21	292	
132	2 C12	Neeley	HRW	161	161			167	169	240	F23		
133	2 D01	P9113	SRW	150	157			167			268 H01		
134	2 D02	P92201	SRW	161	157			161			268 H03		
135	2 D03	Paladin	HRW	163	170			167			265 H05		
136	2 D04	Patwin	HWS	165	157			165			281 H07		
137	2 D05	Pavon	HWS	161	157			167			279 H09		
138	2 D06	Peak_72	HRS	161	153			167			279 H11		
139	2 D07	Platte	HWW	169	170			167			280 H13		
140	2 D08	Pomerelle	SWS	161			205	167	167	240	279 H15	282	

141														
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155			SD98W175-1											
156									167					
157 2 F01 Springfield SWS 169 159 207 167 167 240 279 L01 292 158 2 F02 Stephens SWW 152 159 202 165 167 240 281 L03 279 159 2 F03 Stephens_OS3A SWW 152 159 202 165 167 240 281 L07 292 160 2 F04 Stephens_OS3A SWW 152 159 202 165 167 240 281 L07 292 161 2 F05 Sterling SWS 161 153 202 167 167 240 281 L07 292 163 2 F07 Sunco HWS 163 157 196 170 171 243 281 L11 292 164 2 F08 TAM105 HRW 161 157 205 170 167 240 265 L17 292 165 2 F09 TAM107 HRW 168 161 205 170 171 242 265 L17 292 166 2 F11 TC14 </td <td></td> <td></td> <td>Skookum_(ML04</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>167</td> <td></td> <td></td> <td></td> <td></td> <td></td>			Skookum_(ML04						167					
158 2 FO2 Stephens SWW 152 159 202 165 167 240 281 L03 279 159 2 FO3 Stephens_OS3A SWW 152 159 202 165 167 240 281 L05 279 160 2 FO4 Stephens_OS7A SWW 152 159 202 165 167 240 281 L07 292 161 2 FO5 Sterling SWS 161 153 202 167 167 240 281 L09 292 162 2 FO6 Summit HRS 163 157 196 170 171 243 281 L11 292 163 2 FO7 Sunco HWS 205 167 167 240 L13 292 164 2 F08 TAS551 HWS 161 157 205 167 171 240 265 L17 292 165 2 F09 TAM107 HRW 168 161 157 205 167 171 240 265 L17 292 166 2 F10 TAM107 HRW 168 161 157 205 167 171 2														
159 2 FO3 Stephens_OS3A SWW 152 159 202 165 167 240 281 L05 292 160 2 FO4 Stephens_OS7A SWW 152 159 202 165 167 240 281 L07 292 161 2 FO5 Sterling SWS 161 153 202 167 167 240 281 L09 292 162 2 FO6 Summit HRS 163 157 196 170 171 243 281 L11 292 163 2 FO7 Sumo HWS 163 157 196 170 171 240 L15 292 164 2 FO8 TAS551 HWS 161 157 205 167 171 240 265 L17 292 165 2 F07 TAM105 HRW 168 161 205 167 167 240 281 L21	157	2 F01	Springfield	SWS	169	159	207	167	167	240	279	L01	292	
160 2 FO4 Stephens_OS7A SWW 152 159 202 165 167 240 281 L07 292 161 2 FO5 Sterling SWS 161 153 202 167 167 240 281 L09 292 162 2 FO6 Summit HRS 163 157 196 170 171 243 281 L11 292 163 2 FO7 Sunco HWS 205 167 167 240 L13 292 164 2 FO8 TAS551 HWS 205 167 167 240 L13 292 165 2 F09 TAM105 HRW 161 157 205 167 171 240 265 L17 292 166 2 F10 TAM107 HRW 168 161 205 170 171 242 L19 292 167 2 F11 TC14 HWS 161 159 207 170 167 240 L23 292 168 2 F12 Springfield SWS 169 159 207 167 167 240 281 N01	158	2 F02	Stephens	SWW	152	159			167	240	281	L03	279	
161 2 FOS Sterling SWS 161 153 202 167 167 240 281 L09 292 162 2 FO6 Summit HRS 163 157 196 170 171 243 281 L11 292 163 2 FO7 Sunco HWS 205 167 167 240 L13 292 164 2 FO8 TAS551 HWS 205 170 169 L15 292 165 2 FO9 TAM105 HRW 161 157 205 167 171 240 265 L17 292 166 2 F10 TAM107 HRW 168 161 205 170 171 242 L19 292 166 2 F11 TC14 HWS 161 159 207 170 167 240 222 L19 292 168 2 F12 Springfield SWS 169 159 207 167 167 267 240 L23 292 292 169 2 G01 Tubbs06 SWW 159 159 205 170 165 240 281 N01 279 293 292 170 2 G02 Twin SWS 163 159 207 167 167 240 279 N03 292 293 171 2 G03 Ul_Alta_Blanca HWS 169 16			· –		152	159			167				279	
162 2 F06 Summit HRS 163 157 196 170 171 243 281 L11 292 163 2 F07 Sunco HWS 205 167 167 240 L13 292 164 2 F08 TA5551 HWS 205 170 169 L15 292 165 2 F09 TAM105 HRW 161 157 205 167 171 240 265 L17 292 166 2 F10 TAM107 HRW 168 161 205 170 171 242 L19 292 167 2 F11 TC14 HWS 161 159 207 170 167 281 L21 292 168 2 F12 Springfield SWS 169 159 207 167 167 240 L23 292 169 2 G01 Tubbs06 SWW 159 159 205 170 165 240 281 N01 279 293 170 2 G02 Twin SWS 163 159 205 167 167 240 279 N03 292 171 2 G03 UI_Alta_Blanca HWS 169 207 167 167 240 279 N05 292 172 2 G04 UI_Catald	160	2 F04	Stephens_OS7A	SWW	152	159	202	165	167	240	281	L07	292	
163 2 F07 Sunco HWS 205 167 167 240 L13 292 164 2 F08 TA5551 HWS 205 170 169 L15 292 165 2 F09 TAM105 HRW 161 157 205 167 171 240 265 L17 292 166 2 F10 TAM107 HRW 168 161 205 170 171 242 L19 292 167 2 F11 TC14 HWS 161 159 207 167 167 240 L23 292 168 2 F12 Springfield SWS 169 159 207 167 167 240 281 N01 279 293 170 2 G01 Tubso6 SWS 163 159 205 167 167 240 279 N03 292 171 2 G02 Ul_Catalado SWS 161	161	2 F05	-	SWS	161	153	202	167					292	
164 2 F08 TA5551 HWS 205 170 169 L15 292 165 2 F09 TAM105 HRW 161 157 205 167 171 240 265 L17 292 166 2 F10 TAM107 HRW 168 161 205 170 171 242 L19 292 167 2 F11 TC14 HWS 161 159 207 170 167 240 L23 292 168 2 F12 Springfield SWS 169 159 207 167 167 240 L23 292 169 2 G01 Tubbs06 SWW 159 159 205 170 165 240 281 N01 279 293 170 2 G02 Twin SWS 163 159 205 167 167 240 279 N05 292 171 2 G03 Ul_Clatlado SWS 161 153 207 167 167 240 279 N05 292 172 2 G04 Ul_Catlado	162	2 F06	Summit	HRS	163	157	196	170	171	243	281	L11	292	
165 2 F09 TAM105 HRW 161 157 205 167 171 240 265 L17 292 166 2 F10 TAM107 HRW 168 161 205 170 171 242 L19 292 167 2 F11 TC14 HWS 161 159 207 170 167 240 L23 292 168 2 F12 Springfield SWS 169 159 207 167 167 240 L23 292 169 2 G01 Tubbs06 SWW 159 159 205 170 165 240 281 N01 279 293 170 2 G02 Twin SWS 163 159 205 167 167 240 279 N03 292 171 2 G03 Ul_Alta_Blanca HWS 169 207 167 167 240 279 N05 292 172 2 G04 Ul_Cataldo SWS 161 153 207 167 167 240 279 N05 292 173 2 G06 Ul_Darwin	163	2 F07	Sunco	HWS			205	167	167	240	1	L13	292	
166 2 F10 TAM107 HRW 168 161 205 170 171 242 L19 292 167 2 F11 TC14 HWS 161 159 207 170 167 281 L21 292 168 2 F12 Springfield SWS 169 159 207 167 167 240 L23 292 169 2 G01 Tubbs06 SWW 159 159 205 170 165 240 281 N01 279 293 170 2 G02 Twin SWS 163 159 205 167 167 240 279 N03 292 171 2 G03 Ul_Alta_Blanca HWS 169 207 167 167 240 279 N05 292 172 2 G04 Ul_Cataldo SWS 161 153 207 161 167 240 279 N05 292 173 2 G05 Ul_Galielo HWW 159 161 205 165 167 240 279 N11 292 174 2 G06 Ul_Lochsa HWS	164	2 F08	TA5551	HWS			205	170	169		١	L15	292	
167 2 F11 TC14 HWS 161 159 207 170 167 281 L21 292 168 2 F12 Springfield SWS 169 159 207 167 167 240 L23 292 169 2 G01 Tubbs06 SWW 159 159 205 170 165 240 281 N01 279 293 170 2 G02 Twin SWS 163 159 205 167 167 240 279 N03 292 171 2 G03 Ul_Alta_Blanca HWS 169 207 167 167 240 279 N05 292 172 2 G04 Ul_Cataldo SWS 161 153 207 161 167 240 N07 292 173 2 G05 Ul_Galielo HWW 159 161 205 165 167 240 279 N15 279 174 2 G06 Ul_Lochsa HWS 165 161 207 167 167 240 284 N13 </td <td>165</td> <td>2 F09</td> <td>TAM105</td> <td>HRW</td> <td>161</td> <td>157</td> <td>205</td> <td>167</td> <td>171</td> <td>240</td> <td>265</td> <td>L17</td> <td>292</td> <td></td>	165	2 F09	TAM105	HRW	161	157	205	167	171	240	265	L17	292	
168 2 F12 Springfield SWS 169 159 207 167 167 240 L23 292 169 2 G01 Tubbs06 SWW 159 159 205 170 165 240 281 N01 279 293 170 2 G02 Twin SWS 163 159 205 167 167 240 279 N03 292 171 2 G03 UI_Alta_Blanca HWS 169 207 167 167 240 279 N05 292 172 2 G04 UI_Cataldo SWS 161 153 207 161 167 240 279 N05 292 173 2 G05 UI_Darwin HWW 159 167 240 279 N09 292 174 2 G06 UI_Galielo HWW 161 205 165 167 240 279 N11 292 175 2 G07 UI_Lochsa HWS 165 161 207 167 249 284 N13 292 176 2 G08 UI_Pettit SWS 161 159 205 167 167 240 279 N15 279 177 2 G09 W96-359W HWW 152 159 207 167 <td>166</td> <td>2 F10</td> <td>TAM107</td> <td>HRW</td> <td>168</td> <td>161</td> <td>205</td> <td>170</td> <td>171</td> <td>242</td> <td>- 1</td> <td>L19</td> <td>292</td> <td></td>	166	2 F10	TAM107	HRW	168	161	205	170	171	242	- 1	L19	292	
169 2 G01 Tubbs06 SWW 159 159 205 170 165 240 281 N01 279 293 170 2 G02 Twin SWS 163 159 205 167 167 240 279 N03 292 171 2 G03 UI_Alta_Blanca HWS 169 207 167 167 240 279 N05 292 172 2 G04 UI_Cataldo SWS 161 153 207 161 167 240 279 N07 292 173 2 G05 UI_Darwin HWW 159 167 240 279 N07 292 174 2 G06 UI_Galielo HWW 161 205 165 167 240 279 N11 292 175 2 G07 UI_Lochsa HWS 165 161 207 167 249 284 N13 292 176 2 G08 UI_Pettit SWS 161 159 205 167 167 240	167	2 F11	TC14	HWS	161	159	207	170	167		281	L21	292	
170 2 G02 Twin SWS 163 159 205 167 167 240 279 N03 292 171 2 G03 Ul_Alta_Blanca HWS 169 207 167 167 240 279 N05 292 172 2 G04 Ul_Cataldo SWS 161 153 207 161 167 240 279 N09 292 173 2 G05 Ul_Darwin HWW 159 167 240 279 N09 292 174 2 G06 Ul_Galielo HWW 161 205 165 167 240 279 N11 292 175 2 G07 Ul_Lochsa HWS 165 161 207 167 249 284 N13 292 176 2 G08 Ul_Pettit SWS 161 159 205 167 167 240 279 N15 279 177 2 G09 W96-359W HWW 152 159 207 167 162 240 265 N17 279 178 2 G10 Wakanz SWS 161 159 205 165 167 240 268 N19 295 179 2 G11 Wawawai SWS 163 159 205 165 167 240 281 N21 295 180 2 G12 Solano - 240	168	2 F12	Springfield	SWS	169	159	207	167	167	240	- 1	L23	292	
171 2 G03 UI_Alta_Blanca HWS 169 207 167 167 240 279 N05 292 172 2 G04 UI_Cataldo SWS 161 153 207 161 167 240 79 N05 292 173 2 G05 UI_Darwin HWW 159 167 240 279 N09 292 174 2 G06 UI_Galielo HWW 161 205 165 167 240 279 N11 292 175 2 G07 UI_Lochsa HWS 165 161 207 167 249 284 N13 292 176 2 G08 UI_Pettit SWS 161 159 205 167 167 240 279 N15 279 177 2 G09 W96-359W HWW 152 159 207 167 162 240 265 N17 279 178 2 G10 Wakanz SWS 161 159 205 165 167 240 268 N19 295 179 2 G11 Wawawai SWS 163 153 207 165 167 240 281 N21 295 180 2 G12 Solano - 240 N23 295 181 2 H01 WPB-470 SWW 165 155 205 172 167 240 279 P01 292 182 2 H02 WPB_528 SWW 163 159 205 167 167 240 279 P03 279 183 2 H03 WQL9HDALP HWS 163 159 202 167 167 240 279 P03 279 184 2 H04 X9602044-2C SWW 152 163 202 167 167 240 279 P07 292 185 2 H05 X960277L SWW 152 155 207 165 167 240 279 P11 292	169	2 G01	Tubbs06	SWW	159	159	205	170	165	240	281	N01	279	293
172 2 G04 UI_Cataldo SWS 161 153 207 161 167 240 N07 292 173 2 G05 UI_Darwin HWW 159 167 240 279 N09 292 174 2 G06 UI_Galielo HWW 161 205 165 167 240 279 N11 292 175 2 G07 UI_Lochsa HWS 165 161 207 167 249 284 N13 292 176 2 G08 UI_Pettit SWS 161 159 205 167 167 240 279 N15 279 177 2 G09 W96-359W HWW 152 159 207 167 162 240 265 N17 279 178 2 G10 Wakanz SWS 161 159 205 165 167 240 268 N19 295 179 2 G11 Wawawai SWS 163 153 207 165 167 240 281 N21 295 180 2 G12 Solano - 240 N23 295 181 2 H01 WPB-470 SWW 165 155 205 172 167 240 279 P01 292 182 2 H02 WPB_528 SWW 163 159 202 167 167 240 279 P03 279 183 2 H03 WQL9HDALP HWS 163 159 202 167 167 240 279 P07 292 185 <td< td=""><td>170</td><td>2 G02</td><td>Twin</td><td>SWS</td><td>163</td><td>159</td><td>205</td><td>167</td><td>167</td><td>240</td><td>279</td><td>N03</td><td>292</td><td></td></td<>	170	2 G02	Twin	SWS	163	159	205	167	167	240	279	N03	292	
173 2 G05 UI_Darwin HWW 159 167 240 279 N09 292 174 2 G06 UI_Galielo HWW 161 205 165 167 240 279 N11 292 175 2 G07 UI_Lochsa HWS 165 161 207 167 249 284 N13 292 176 2 G08 UI_Pettit SWS 161 159 205 167 167 240 279 N15 279 177 2 G09 W96-359W HWW 152 159 207 167 162 240 265 N17 279 178 2 G10 Wakanz SWS 161 159 205 165 167 240 268 N19 295 179 2 G11 Wawawai SWS 163 153 207 165 167 240 281 N21 295 180 2 G12 Solano - 240 N23 295 181 2 H01 WPB-470 SWW 165 155 205 172 167 240 279 P01 292 182 2 H02 WPB_528 SWW 163 155 205 172 165 240 279 P03 279 183 2 H03 WQL9HDALP HWS 163 159 202 167 167 240 281 P05 295 184 2 H04 X9602044-2C SWW 152 163 202 167 167 240 279 P07 292 185 2 H05 X960277L SWW 152 155 207 165 167 240 279 P11 292 186 2 H06 X96283+284-2C SWW 159 165 202 172 167 240 279 P11 292	171	2 G03	UI_Alta_Blanca	HWS	169		207	167	167	240	279	N05	292	
174 2 G06 UI_Galielo HWW 161 205 165 167 240 279 N11 292 175 2 G07 UI_Lochsa HWS 165 161 207 167 249 284 N13 292 176 2 G08 UI_Pettit SWS 161 159 205 167 167 240 279 N15 279 177 2 G09 W96-359W HWW 152 159 207 167 162 240 265 N17 279 178 2 G10 Wakanz SWS 161 159 205 165 167 240 268 N19 295 179 2 G11 Wawawai SWS 163 153 207 165 167 240 281 N21 295 180 2 G12 Solano - 240 N23 295 181 2 H01 WPB-470 SWW 165 155 205 172 167 240 279 P01 292 182 2 H02 WPB_528 SWW 163 155 205 172 165 240 279 P03 279 183 2 H03 WQL9HDALP HWS 163 159 202 167 167 240 279 P07 292 184 2 H04 X9602044-2C SWW 152 163 202 167 167 240 279 P07 292 185 2 H05 X960277L SWW 152 155 207 165 167 240 279 P11 292	172	2 G04	UI_Cataldo	SWS	161	153	207	161	167	240	1	N07	292	
175 2 G07 UI_Lochsa HWS 165 161 207 167 249 284 N13 292 176 2 G08 UI_Pettit SWS 161 159 205 167 167 240 279 N15 279 177 2 G09 W96-359W HWW 152 159 207 167 162 240 265 N17 279 178 2 G10 Wakanz SWS 161 159 205 165 167 240 268 N19 295 179 2 G11 Wawawai SWS 163 153 207 165 167 240 268 N19 295 180 2 G12 Solano - 240 N23 295 181 2 H01 WPB-470 SWW 165 155 205 172 167 240 279 P01 292 182 2 H02 WPB_528 SWW 163 155 205 172 165 240 279 P03 279 183 2 H03 WQL9HDALP HWS 163 159 202 167 167 240 281 P05 295 184 2 H04 X9602044-2C SWW 152 163 202 167 167 240 279 P07 292 185 2 H05 X960277L SWW 159	173	2 G05	UI_Darwin	HWW	159			167		240	279	N09	292	
176 2 G08 UI_Pettit SWS 161 159 205 167 167 240 279 N15 279 177 2 G09 W96-359W HWW 152 159 207 167 162 240 265 N17 279 178 2 G10 Wakanz SWS 161 159 205 165 167 240 268 N19 295 179 2 G11 Wawawai SWS 163 153 207 165 167 240 281 N21 295 180 2 G12 Solano - 240 N23 295 181 2 H01 WPB-470 SWW 165 155 205 172 167 240 279 P01 292 182 2 H02 WPB_528 SWW 163 155 205 172 165 240 279 P03 279 183 2 H03 WQL9HDALP HWS 163 159 202 167 167 240 281 P05 295 184 2 H04 X9602044-2C SWW 152 163 202 167 167 240 279 P07 292 185 2 H05 X960277L SWW 152 155 207 165 167 240 279 P11 292 186 2 H06 X96283+284-2C SWW 159 1	174	2 G06	UI_Galielo	HWW		161	205	165	167	240	279	N11	292	
177 2 G09 W96-359W HWW 152 159 207 167 162 240 265 N17 279 178 2 G10 Wakanz SWS 161 159 205 165 167 240 268 N19 295 179 2 G11 Wawawai SWS 163 153 207 165 167 240 281 N21 295 180 2 G12 Solano - 240 N23 295 181 2 H01 WPB-470 SWW 165 155 205 172 167 240 279 P01 292 182 2 H02 WPB_528 SWW 163 155 205 172 165 240 279 P03 279 183 2 H03 WQL9HDALP HWS 163 159 202 167 167 240 281 P05 295 184 2 H04 X9602044-2C SWW 152 163 202 167 165 167 240 279 P07 292 185 2 H05 X960277L SWW 152 155 207 165 167 240 P09 292 186 2 H06 X96283+284-2C SWW 159 165 202 172 167 240 279 P11 292	175	2 G07	UI_Lochsa	HWS	165	161	207	167		249	284	N13	292	
178 2 G10 Wakanz SWS 161 159 205 165 167 240 268 N19 295 179 2 G11 Wawawai SWS 163 153 207 165 167 240 281 N21 295 180 2 G12 Solano - 240 N23 295 181 2 H01 WPB-470 SWW 165 155 205 172 167 240 279 P01 292 182 2 H02 WPB_528 SWW 163 155 205 172 165 240 279 P03 279 183 2 H03 WQL9HDALP HWS 163 159 202 167 167 240 281 P05 295 184 2 H04 X9602044-2C SWW 152 163 202 167 167 240 279 P07 292 185 2 H05 X960277L SWW 152 155 207 165 167 240 P09 292 186 2 H06 X96283+284-2C SWW 159 165 202 172 167 240 279 P11 292	176	2 G08	UI_Pettit	SWS	161	159	205	167	167	240	279	N15	279	
179 2 G11 Wawawai SWS 163 153 207 165 167 240 281 N21 295 180 2 G12 Solano - 240 N23 295 181 2 H01 WPB-470 SWW 165 155 205 172 167 240 279 P01 292 182 2 H02 WPB_528 SWW 163 155 205 172 165 240 279 P03 279 183 2 H03 WQL9HDALP HWS 163 159 202 167 167 240 281 P05 295 184 2 H04 X9602044-2C SWW 152 163 202 167 167 240 279 P07 292 185 2 H05 X960277L SWW 152 155 207 165 167 240 P09 292 186 2 H06 X96283+284-2C SWW 159 165 202 172 167 240 279 P11 292	177	2 G09	W96-359W	HWW	152	159	207	167	162	240	265	N17	279	
180 2 G12 Solano - 240 N23 295 181 2 H01 WPB-470 SWW 165 155 205 172 167 240 279 P01 292 182 2 H02 WPB_528 SWW 163 155 205 172 165 240 279 P03 279 183 2 H03 WQL9HDALP HWS 163 159 202 167 167 240 281 P05 295 184 2 H04 X9602044-2C SWW 152 163 202 167 167 240 279 P07 292 185 2 H05 X960277L SWW 152 155 207 165 167 240 P09 292 186 2 H06 X96283+284-2C SWW 159 165 202 172 167 240 279 P11 292	178	2 G10	Wakanz	SWS	161	159	205	165	167	240	268	N19	295	
181 2 H01 WPB-470 SWW 165 155 205 172 167 240 279 P01 292 182 2 H02 WPB_528 SWW 163 155 205 172 165 240 279 P03 279 183 2 H03 WQL9HDALP HWS 163 159 202 167 167 240 281 P05 295 184 2 H04 X9602044-2C SWW 152 163 202 167 167 240 279 P07 292 185 2 H05 X960277L SWW 152 155 207 165 167 240 P09 292 186 2 H06 X96283+284-2C SWW 159 165 202 172 167 240 279 P11 292	179	2 G11	Wawawai	SWS	163	153	207	165	167	240	281	N21	295	
182 2 H02 WPB_528 SWW 163 155 205 172 165 240 279 P03 279 183 2 H03 WQL9HDALP HWS 163 159 202 167 167 240 281 P05 295 184 2 H04 X9602044-2C SWW 152 163 202 167 167 240 279 P07 292 185 2 H05 X960277L SWW 152 155 207 165 167 240 P09 292 186 2 H06 X96283+284-2C SWW 159 165 202 172 167 240 279 P11 292	180	2 G12	Solano	-						240	1	N23	295	
183 2 H03 WQL9HDALP HWS 163 159 202 167 167 240 281 P05 295 184 2 H04 X9602044-2C SWW 152 163 202 167 167 240 279 P07 292 185 2 H05 X960277L SWW 152 155 207 165 167 240 P09 292 186 2 H06 X96283+284-2C SWW 159 165 202 172 167 240 279 P11 292	181	2 H01	WPB-470	SWW	165	155	205	172	167	240	279	P01	292	
184 2 H04 X9602044-2C SWW 152 163 202 167 167 240 279 P07 292 185 2 H05 X960277L SWW 152 155 207 165 167 240 P09 292 186 2 H06 X96283+284-2C SWW 159 165 202 172 167 240 279 P11 292	182	2 H02	WPB_528	SWW	163	155	205	172	165	240	279	P03	279	
185 2 H05 X960277L SWW 152 155 207 165 167 240 P09 292 186 2 H06 X96283+284-2C SWW 159 165 202 172 167 240 279 P11 292	183	2 H03	WQL9HDALP	HWS	163	159	202	167	167	240	281	P05	295	
186 2 H06 X96283+284-2C SWW 159 165 202 172 167 240 279 P11 292	184	2 H04	X9602044-2C	SWW	152	163	202	167	167	240	279	P07	292	
	185	2 H05	X960277L	SWW	152	155	207	165	167	240		P09	292	
187 2 H07 X96691+692-2L SWW 165 165 207 170 240 279 P13 292	186	2 H06	X96283+284-2C	SWW	159	165	202	172	167	240	279	P11	292	
	187	2 H07	X96691+692-2L	SWW	165	165	207	170		240	279	P13	292	

188	2 H08	X970175-3C	SWW	152	159	202 165	167 2	40 P15	292
189	2 H09	X970184-1C	SWW	152	165	207 165	167 2	49 276 P17	282
190	2 H10	Xerpha	SWW	156		202 165	165 2	40 <mark>281</mark> P19	292
191	2 H11	Yellowstone	HRW		161	207 170		P21	292
192	2 H12	H2O	_					P23	

28/1	gdm:384	າ ຜານກາ ຜາ	um 38/1 v	wmc 38/	harc	harc, 38/1 v	adm(cour	nt	% similiarity
A02	208 A01	167	A02	230 A01	barc.	A02	153	7	•
A04	207 A03	155	A04	230 A03	238	A04	153	7	
A06	207 A05	160	A06	230 A05	238	A06	153	7	
A08	207 A07	160	A08	230 A07	221	A08	153	8	
A10	207 A09	160	A10	230 A09	238	A10	153	7	
A12	207 A03	161	A10	230 A03	238	A10	157	6	
A14	207 A11 207 A13	169	A12	230 A11	226	A12	157	5	
A14	207 A15	169	A14	230 A15	238	A14	153	8	
A18	207 A13	103	A18	A17	230	A10	133	O	0.571425
A20	207 A19	157	A20	237 A19	238	A20	153	7	
A20	207 A13 207 A21	157	A20	230 A21	238	A20	153	9	
A24	208 A23	167	A24	230 A21 230 A23	241	A24	153	8	
C02	208 A23 207 C01	165	C02	230 C01	226	C02	153	8	
C02	207 C01 207 C03	171	C02	229 C03	226	C02	153	7	
C04	207 C03 208 C05	177	C04	230 C05	238	C04	157	6	
C08	208 C03 207 C07	160	C08	230 C03 232 C07	238	C08	153	6	
C10	207 C07 207 C09	155	C10	230 C09	238	C10	153	8	
C10	207 C03 207 C11	157	C10	C11	226	C10	153	7	
C12	207 C11 207 C13	165	C12	230 C13	226	C12	153	9	
C14	207 C15	157	C14	230 C15	226	C14	157	<i>5</i>	
C18	207 C13 207 C17	177	C18	230 C13	220	C18	157	6	
C20	207 C17 207 C19	157	C20	230 C17 230 C19		C18	153	5	
C20	207 C19 207 C21	157	C20	230 C19 230 C21	241	C20	153	5 5	
C24	207 C21 207 C23	165	C24	230 C21 230 C23	226	C22	153	8	
E02	207 C23 208 E01	167	E02	230 C23 230 E01	226	E02	157	5	
E02	208 E01 208 E03	165	E02	230 E01 230 E03	226	E02	157	5 7	
E04	208 E03 207 E05	169	E04	230 E05	238	E04	157	7	
E08	207 E07	157	E08	230 E07	238	E08	153	7	
E10	207 E09	157	E10	230 E07 232 E09	238	E10	157	7	
E12	207 E03 207 E11		E12	230 E11		E12	153	8	
E14	207 E11 207 E13	167	E14	230 E11 230 E13	220	E14	157	7	
E16	207 E15	160	E16	230 E15	226	E16	153	8	
E18	207 E13	160	E18	230 E13	226	E18	153	9	
E20	207 E17 207 E19	160		230 E19		E20	153	6	
E22	207 E21	100	E22	230 E21		E22	153	7	
E24	207 E21 208 E23		E24	230 E23	241	E24	157	4	
G02	208 G01	169		230 G01	220		157	7	
G04	208 G01 207 G03	165	G04	G03			153	6	
G04				232 G05		G04		4	
G08	207 G03 207 G07		G08	232 G03 230 G07			153	3	
G10	207 G07 208 G09		G10	G09		G10	100	5 5	
	208 G09 208 G11			230 G11		G10 G12	153	8	
G12	208 G11 207 G13	165		230 G11 230 G13		G12 G14		10	
G14				230 G15 230 G15			153	6	
G18	207 G13 207 G17			230 G13 230 G17		G18		5	
G18		165		230 G17 230 G19		G18 G20	13/	3	
U2U	919	103	020	230 919	220	020		3	0.214200

G22	208 G21	162	G22	230	G21	238	G22	159	7	0.5
G24	208 G23	102	G24		G23	238	G24	157	4	0.285714
102	208 I01	160	102	230	101		102	153	8	0.571429
104	207 103	157	104	230	103	238	104	157	5	0.357143
106	207 105	160 16	7 106	230	105	221	106	153	7	0.5
108	207 107	160	108	230	107	238	108	153	7	0.5
110	207 109	169	110	230	109	221	110	153	6	0.428571
112	208 I11	167	112	230		226	112	157	6	0.428571
114	207 I13	160	114	230			114	153	7	0.5
l16	207 I15	155	l16	232		226	l16	153	6	0.428571
118	208 117	155	118	230		238	I18	153	11	0.785714
120	208 119	155	120	237		238	120	153	9	0.642857
122	207 21	169	122	230		241	122	153	4	0.285714
124	208 I23	160	124	230		241	124	153	6	0.428571
K02 K04	207 K01 207 K03	160 157	K02 K04		K01 K03	238238	K02 K04	153153	8	0.571429 0.428571
K04	207 K05	157	K04		K05	226	K04 K06	157	6	0.428571
K08	208 K07	165	K08		K07	226	K08	153	11	0.785714
K10	207 K09	169	K10		K07	238	K10	153	5	0.357143
K12	207 K11	160	K12		K11	238	K12	153	5	0.357113
K14	207 K13	153	K14		K13	238	K14	153	6	0.428571
K16	207 K15	157	K16		K15	238	K16	159	5	0.357143
K18	207 K17	153	K18	230	K17	226	K18	157	8	0.571429
K20	207 K19	169	K20	230	K19	238	K20	157	7	0.5
K22	207 K21	167	K22	230	K21	238	K22	157	5	0.357143
K24	207 K23	160	K24	230	K23	238	K24	153	6	0.428571
M02	207 M01	169	M02	230	M01	226	M02	153	7	0.5
M04	208 M03	167	M04	230	M03		M04	153	7	0.5
	207 M05				M05		M06		7	0.5
	207 M07				M07		M08		7	0.5
	207 M09					238				0.357143
	208 M11					238			10	0.714286
	207 M13					238				0.571429
	208 M15				M15	220	M16		7	0.5
	207 M17 207 M19					238 226			5 7	0.357143
	207 M119				M21		M20 M22		6	0.428571
	207 M23				M23		M24		8	
	207 001				001		002		8	
004		157			003		004		6	0.428571
	207 005				005		006		7	0.5
					007		008		6	0.428571
	208 0 09				009		010		9	
012	207 O11	177	012	230	011		012	157	4	0.285714
014	207 O13	155	014	232	013	238	014	153	4	0.285714
016	208 O15	155	016	230	015	238	016	153	6	0.428571
018	207 O17	165	018	232	017	226	018	153	10	0.714286

020	207 O 19	160	020	230 019	1 220	020	153	6	0.428571
020	207 019	157	020	230 01		020	157	6	0.428571
024	207 021	165	024	230 02		022	153	8	0.428371
B02	207 B01	165	B02	230 B01		B02	153	10	0.714286
B02	207 B01 207 B03	169	B02	230 B03		B04	153	8	0.714280
B04	207 B05	155	B04	230 BOS		B04	153	9	0.642857
B08	207 B03 207 B07	157	B08	230 B03			153	6	0.0428571
B10	207 B07 207 B09	160	B10	230 BO		B08 B10	153	7	0.428371
B10	207 B09 207 B11	165	B10	230 BUS		B10 B12	153	10	0.5
B14	207 B11 207 B13	165	B14	230 B13		B12	153	10	0.714286
B14	207 B15	165	B14	230 B15				11	0.714280
B18	207 B13	169	B18	B17		B16	153157	5	0.765714
B20	207 B17 207 B19	157	B20	230 B19		B18 B20	157	6	0.337143
B20	207 B19 207 B21	155	B20	230 B13		B20 B22	153	5	0.357143
B24	B23			230 B23		B24	153		0.537143
	207 D01	165	B24	230 DO:				9	0.642857
D02 D04	207 D01 207 D03	157	D02			D02 D04	153	9 5	
		155	D04	230 DO			153		0.357143
D06	207 D05	153	D06	230 DO		D06	153	6	0.428571
D08	207 D07	160	D08	230 D0		D08	153	8	0.571429
D10	207 D09	160	D10	243 D09		D10	153	7	0.5
D12	207 D11	165	D12	230 D1:		D12	153	8	0.571429
D14	207 D13	157	D14	230 D13		D14	157	6	0.428571
D16	207 D15	167	D16	230 D1!		D16	157	6	0.428571
D18	207 D17	157	D18	232 D17		D18	153	6	0.428571
D20	207 D19	157	D20	232 D19		D20	153	6	0.428571
D22	207 D21	157	D22	232 D2:		D22	153	7	0.5
D24	207 D23	157	D24	230 D23		D24	153	8	0.571429
F02	207 F01	157	F02	230 F01		F02	153	8	0.571429
F04	207 F03	160	F04	230 F03 232 F05		F04	153	6	0.428571
F06	207 F05	160	F06			F06	153	5	0.357143
F08	207 F07	157	F08	230 F07			153		0.428571
F10	207 F09	161	F10	230 F09		F10	153	7	0.5
F12	207 F11	157	F12	230 F11		F12	153	6	0.428571
F14	208 F13	157	F14	230 F13		F14	153	6	0.428571
F16	207 F15	167	F16	230 F15		F16	157	4	0.285714
F18	207 F17	167	F18	230 F17		F18	157	6	0.428571
F20	207 F19	165	F20	230 F19		F20	153	9	0.642857
F22	207 F21		F22	230 F21		F22	153	8	0.571429
F24	207 F23	1.00	F24	230 F23		F24	153	6	0.428571
H02		169		230 HO		H02	157	7	0.5
H04	207 H03	157	H04	230 HO		H04	153	7	0.5
H06	208 H05	161	H06	230 HO		H06	153	4	0.285714
H08	208 H07	165		230 HO		H08	153	8	0.571429
H10	208 H09	157		230 H09		H10	153	10	0.714286
		155		230 H1:		H12		7	0.5
H14	207 H13	161		230 H13		H14	153	5	0.357143
H16	208 H15	169	H16	232 H1	238	H16	153	6	0.428571

H18	207 H17	160	H18	232	H17	238		H18	153	6	0.428571
H20	207 H19		H20	230	H19	238		H20	153	7	0.5
H22	207 H21		H22	230	H21	226		H22	153	7	0.5
H24	207 H23		H24	230	H23	241		H24	157	6	0.428571
J02	208 J01	157	J02	230	J01	238		J02	153	5	0.357143
J04	207 J03	177	J04	230	J03	238		J04	153	6	0.428571
J06	207 J05	165	J06	230	J05	226		J06	157	8	0.571429
J08	207 J07	157	J08	230	J07	238		J08	157	6	0.428571
J10	207 J09	169	J10	230	J09	238		J10	153	6	0.428571
J12	207 J11	157	J12	232		226		J12		6	0.428571
J14	207 J13	169	J14	230		238		J14	153	6	0.428571
J16	207 J15	157	J16	230		238		J16	153	6	0.428571
J18	207 J17	169	J18	230		230		J18	157	6	0.428571
J20	207 J19	165	J20	230		226		J20	153	8	0.571429
J22	208 J21	157	J22	230		238		J22	153	10	0.714286
J24	208 J21 208 J23	157	J24	230		238		J24	153	6	0.714280
										9	
L02	208 L01	169	L02		L01	238		L02	153	_	0.642857
L04	207 L03	165	L04		L03	226		L04	153	9	0.642857
L06	207 L05	165	L06		L05	226		L06	153	9	0.642857
L08	207 L07	165	L08	230		226		L08	153	10	0.714286
L10	207 L09	160	L10		L09	226		L10	153	9	0.642857
L12	208 L11	157	L12		L11	238		L12	153	8	0.571429
L14	207 L13	157	L14		L13	238		L14	153	6	0.428571
L16	207 L15	169	L16		L15	226		L16	153	6	0.428571
L18	207 L17	157	L18	230	L17	238		L18	157	6	0.428571
L20	207 L19	177	L20	230	L19	238	241	L20	153	5	0.357143
L22	207 L21	169	L22	230	L21	226		L22	157	10	0.714286
L24	208 L23	169	L24	230	L23	238		L24	153	8	0.571429
N02	207 N01	165	N02	230	N01	226		N02	153	10	0.714286
N04	208 N03	169	N04	230	N03	238		N04	153	8	0.571429
N06	207 N05	169	N06	230	N05	238		N06	153	8	0.571429
N08	207 N07	160	N08	230	N07	238		N08	153	7	0.5
N10	207 N09	169	N10		N09	238		N10	157	5	0.357143
N12	207 N11		N12		N11	238		N12	157	5	0.357143
N14	207 N13	155	N14	230	N13	238		N14	153	6	0.428571
N16	208 N15	157	N16	243	N15	238		N16	153	7	0.5
N18	207 N17	167	N18	230	N17	238		N18	153	6	0.428571
N20	207 N19	160	N20	230	N19	226		N20	153	9	0.642857
	207 N21				N21			N22			0.571429
N24	N23		N24		N23			N24			0
P02	207 P01	155		243	P01	226		P02	153	6	0.428571
P04		165	P04		P03			P04	153		0.120371
P06	207 P05	160			P05			P06	153	8	
P08	207 P07	157			P07			P08	153		0.571429
P10		155			P09				153	8	
P10 P12	207 P09 207 P11	157	P10 P12		P11			P10 P12	153	7	0.571429
P14	207 P13	133	r14	230	P13	220		P14	103	ŏ	0.571429

P16	207 P15	157	P16	230 P15	226	P16	153	8	0.571429
P18	207 P17	157	P18	230 P17	226	P18	153	7	0.5
P20	207 P19	165	P20	230 P19	226	P20	157	8	0.571429
P22	207 P21	169	P22	230 P21	238	P22	157	5	0.357143
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AA AA CC AA AA AA CC AA AA GG AA AA AA GG AA AA GG AA AA AA GG CC CC AA CC CC CC AA CC CC TT CC CC CC TT TC TC CC TC TC TC CC AA GG GG AA AA GG GG TT TT CC TT TT TT CC CC CC TT CC CC CC TT GG AA AA GG GG AA AA TT CC CC TT TT CC CC CC TT TT CC CC TT TT CC TT TT CC CC TT TT TT CC CC TT TT CC CC CC TT TT CC CC TT TT TT TT CC TT TT TT CC CC CC TT CC CC CC TT CC TT TT CC CC TT TT CC CC TT CC CC CC TT CC CC TT CC CC CC TT GG GG TT GG GG GG TT AA AA GG AA AA AA GG CC CC AA CC CC CC AA AA GG AA AA AA GG GG CC TT TT CC CC TT CC GG AA AA GG GG AA AA GG AA AA GG GG AA AA TT CC CC TT TT CC CC -- CC CC TT TT CC CC TT TT CC TT TT TT CC AA AA GG AA AA AA CC TT TT CC CC TT TT CC CC TT CC CC CC TT GG AA AA AG AG AA AA AA AA CC AA AA AA AA AA -- -- AA AA AA AA GG AA AA GG GG AA GG GG GG AA GG GG GG CC CC TT CC CC CC CC TT -- CC TT TT CC CC TT TT TT TT TT TT GG GG GG GG GG GG CC CC CC CC CC CC GG AA GG GG GG AA GG CC CC CC CC CC CC TC CC TC TC TC CC TC AA GG AA AA AA GG AA

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AA AA AA AA AA AA TT TT TT TT TT TT CC CC CC CC CC CC AA AA GG GG AA GG GG TT TT CC CC TT CC CC AA AA AA AA AA --AA AA AA AA AA AA CC CC AA AA CC AA AA cc AA AA AA -- AA AA AA GG GG GG GG GG GG TT TT CC CC TT CC CC GG GG GG GG GG GG TT AA AA AC AC AA AC AC TC TC TC TC TC TC AA AA AA AA AA AA AA AA AG -- AA AG AG GG GG GG AA GG AA AA CC CC -- TT CC CC CC GG GG AA AA GG GG GG CC CC CC TT CC CC CC AA AA -- GG AA AA AA CC CC CC CC CC CC TT TT TT TT CC TT TT TT CC CC TT CC CC AA AA GG GG AA GG GG AA AA GG GG AA AA AA TT TT TT CC TT TT TT TC TT TT CC CC CC TT CC CC CC TT CC CC TT GG GG GG GG GG AA CC CC CC AA CC CC CC TT TT TT CC TT TT TT GG GG AA AA GG GG AA TT TT CC CC TT TT CC GG GG AA AA GG GG AA GG GG AA AA GG AA AA CC TT CC CC TT TT CC CC TT CC CC TT TT CC TT CC CC CC CC CC CC TT CC CC CC CC CC CC AA GG GG GG GG GG TT TT TT TT TT TT CC CC CC CC CC CC

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CC TT TT TT TT TT TT CC CC CC CC CC CC TT TT CC TT TT CC TT CC CC CC CC CC CC CC CC CC TT CC CC CC AA GG GG GG GG GG AA AA GG AA AA GG AA GG GG GG GG GG GG TT CC TT TT TT CC CC CC CC CC CC TT AA AG AG AA AA AG AG AG AA AA GG AA AA GG AA AG -- AA GG AG AA GG GG GG GG GG GG GG TT CC CC CC CC CC CC TT GG GG AA AA GG GG GG GG GG GG AA GG GG GG GG GG GG AA GG GG GG TT TT TT CC TT TT TT TT TT TT CC TT TT TT CC CC CC CC TT CC GG GG GG GG TT GG AA AA AA AA CC AA GG GG GG GG AA GG GG GG GG GG AA GG GG GG GG GG AA GG GG GG GG GG GG GG CC AA AA GG AA AA AA AA AA GG AA AA AA AA TT TT CC TT TT TT TT CC TT CC CC TT TT TT AA AA GG AA AA GG AA CC CC CC CC TT CC

TT TT TT TT CC TT GG GG AA GG GG AA GG GG AA AA AA AA AA CC CC CC TT CC TT CC -- CC CC TT CC TT CC AA AA AA AA AA GG GG TT TT TT GG GG AA GG GG GG AA AA TT CC CC CC CC TT TT GG AA AA AA AA AA TT CC CC CC CC CC TT GG TT TT TT TT GG TT CC TT TT TT TT TT CC TT TT TT TT TT TT CC CC CC CC CC TT GG GG GG GG GG GG TT CC CC CC CC CC CC CC TT CC CC TT CC TT TT TT TT CC TT CC TT TT GG TT TT GG TT GG CC CC TT TT CC TT CC CC CC TT CC CC CC CC GG GG GG TT GG GG GG TT CC TT CC CC TT CC GG AA GG AA AA AA AG AA GG AA AA AA GG GG GG TT GG TT GG AA GG AA GG GG AA GG AA GG GG AA GG GG GG AA GG GG AA GG GG GG CC TT TT CC TT CC TT AA AA AA GG AA AA AA AA GG GG AA GG AA GG AA CC AA CC CC AA CC CC CC AA CC CC CC CC GG AA GG AA AA GG AA AA GG AA GG GG AA GG GG GG AA GG GG GG AA GG AA GG GG AA GG CC CC CC CC CC CC TT CC TT CC CC TT CC TT CC TT CC CC TT CC CC TT CC TT TT CC TT TT CC TT CC CC CC CC TT GG TT GG GG TT GG CC TT CC TT TT CC TT TT CC TT CC CC TT CC

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cc cc cc cc cc cc GG GG AA AA GG AA AA CC CC CC CC CC CC TT TT TT TT TT TT AA AA AA GG AA GG AA CC CC CC TT CC TT CC GG GG GG GG AA GG CC CC CC CC TT CC GG GG GG AA GG AA GG TT TT TT TT CC TT TT TT CC TT TT TT CC AA AA GG GG AA AA AA TT TT CC CC TT TT TT CC CC CC CC CC CC AA AA AA AA AA AA CC CC AA CC -- CC AA GG GG GG GG GAA CC CC CC CC CC AA CC CC TT CC CC CC CC AA AA GG AA AA AA AA AA AA AA AA AA cc cc cc cc cc cc TT TT CC TT TT TT TT GG GG AA GG GG GG CC CC TT TT CC TT TT GG GG AA AA GG AA AA CC CC CC TT CC TT CC AA AA GG AA AA GG GG GG GG GG GG GG GG CC CC AA CC CC CC AA CC TT TT CC TT TT CC CC TT TT TT TT CC TT TT TT CC TT TT TT CC AA AA GG AA AA AA GG CC CC TT CC CC CC TT CC CC TT CC CC CC TT CC CC AA CC CC CC AA CC CC CC -- CC CC CC AA AA AA AA GG AA AA AA GG AA AA AA GG CC CC TT CC CC CC TT AA AA GG AA AA AA GG CC CC CC CC TT CC AA AA GG AA AA GG GG TT TT -- TT TT CC --

TT TT CC TT TT CC CC GG GG GG -- GG GG GG CC CC TT CC CC -- TT AA AA GG AA AA GG GG CC CC TT CC CC CC TT CC CC CC CC CC CC TT TT CC -- TT CC CC AA AA AA AA AA AA GG GG AA GG GG AA AA GG GG AA GG GG AA AA CC CC -- CC CC AA --GG GG AA GG GG AA AA TT TT -- TT TT CC --CC CC -- CC CC CC --GG GG GG GG GG GG CC CC AA CC CC CC AA TT TT CC TT TT TT CC TT TT CC -- TT TT CC GG GG AA GG GG GG AA AA AA GG GG AA AA GG AA AA AA GG AA AA GG CC CC CC TT CC CC TT GG AA AA GG AA AA GG CC TT TT CC TT TT CC CC TT TT CC TT TT TT AA AA GG AA AA AA GG GG AA AA GG AA AA AA AG AA AA AA AA AA TT TT TC TT TT TT TC CC TT TT TT TT TT TT AA AA GG GG AA AA GG AA AA AA AA AA CC TT TT CC CC TT TT CC CC CC TT CC CC CC TT CC CC AA CC CC CC AA AA AA CC AA AA AA CC GG GG GG GG GG GG AA GG GG GG GG GG GG AA AA GG AA GG AA TT GG GG GG GG TT GG TT TT TT TT TT TT CC CC CC TT CC CC TT AA CC CC CC CC CC AA GG TT CC CC CC CC CC CC CC CC TT CC CC CC TT TT CC CC CC CC CC CC TT CC CC CC CC CC CC TT TT GG TT TT TT GG GG TT GG TT TT TT GG AA GG AA GG GG GG AA AA GG GG GG GG GG TT TT CC TT TT TT CC GG GG GG GG GG GG CC CC TT CC CC CC TT TT GG TT TT TT TT AA GG GG GG GG GG AA GG GG GG GG GG AA GG GG GG GG GG AA AA AA AA AA AA GG AA GG GG GG AA GG GG GG AA AA GG GG AA CC CC CC TT CC CC TT AA GG AA GG AA GG GG GG AA GG AA AA GG GG AA AA GG GG AA CC TT CC TT CC TT TT AA GG AA GG AA GG GG AA AA GG AA AA AA GG GG GG GG GG GG GG GG GG AA GG GG GG AA TT TT TT TT TT TT CC CC CC CC CC CC AA AA AA AA AA AA AA AA GG AA AA AA TT CC TT TT CC CC TT CC CC TT TT CC CC TT AA AA GG GG AA AA GG CC TT CC CC TT TT CC AA GG AA AA GG GG AA AA GG AA AA GG GG AA GG AA GG GG AA AA GG CC TT CC CC TT TT CC CC CC CC CC CC CC GG AA GG GG AA AA GG CC TT CC CC TT TT CC CC CC CC CC CC CC TT TT TT TT TT TT AA AA GG GG AA AA AA CC CC CC CC CC CC GG GG GG GG GG GG TT CC TT TT CC CC CC AA GG GG GG GG GG GG GG AA AA GG GG GG AA AA AA AA AA AA GG AA AA AA AA AA CC CC CC CC CC CC AA GG AA AA GG GG GG AA GG GG GG GG GG CC TT TT TT TT TT AA AA GG GG AA AA GG AA CC AA AA CC CC CC AA CC AA AA CC CC CC TT CC TT TT CC CC CC CC TT CC CC TT TT CC TT CC TT TT CC CC CC TT GG TT TT GG GG GG GG AA GG GG AA AA GG GG AA GG GG AA AA GG TT GG TT TT GG GG TT CC TT CC CC TT TT CC AA GG AA AA GG GG AA GG AA GG GG AA AA GG TT CC TT TT CC CC TT CC TT CC CC TT TT CC TT CC TT TT CC CC TT GG TT GG GG TG TT GG TT GG TT TT GG GG TT TT CC CC CC CC CC CC CC TT TT TT TT TT CC TT CC CC TT TT CC AA GG GG GG GG GG CC CC CC CC CC CC CC TT CC CC TT TT CC AA GG AA AA GG GG AA AA AA AA AA AA AA TT CC TT TT CC CC TT CC TT TT TT TT TT CC CC CC TT CC CC TT AA AA AA AA AA GG AG GG AG -- GG GG GG GG GG GG GG GG AA GG GG GG GG GG GG AA GG GG GG GG GG GG AA AA AA AA AA AA GG GG GG GG GG GG AA AA AA AA AA CC TT TT TT TT TT

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Sample name		Expresso B	Express D0	Express D0	Express D0	Express D0	Expresso B	Bobwhite
	molecular	ı seq5	seq1	seq2	seq3	seq4	seq6	seq7
Expresso B03	seq5	0						
Express D01	seq1	0.002826	0					
Express D02	seq2	0.001511	0.002629	0				
Express D03	seq3	0.002962	0.001312	0.003954	0			
Express D05	seq4	0.001975	0.003096	0.001185	0.004425	0		
Expresso B04	seq6	0.002776	0.004298	0.00377	0.004438	0.00424	0	
Bobwhite	seq7	0.315785	0.313859	0.313531	0.316617	0.313894	0.319687	0
180-1	seq8	0.171826	0.17756	0.174596	0.176538	0.174274	0.175533	0.386259
181-2	seq9	0.172278	0.178013	0.175049	0.176991	0.174785	0.175988	0.38751
182 (2)-4	seq10	0.179718	0.18553	0.182525	0.184507	0.182263	0.183511	0.3831
183-1	seq11	0.173266	0.179011	0.176041	0.177989	0.175778	0.176986	0.388486
184-2	seq12	0.177761	0.183553	0.180559	0.182911	0.180296	0.181532	0.385396
185-2	seq13	0.175137	0.180907	0.177924	0.179884	0.177661	0.178883	0.386555
186-1	seq14	0.17419	0.179948	0.176971	0.178925	0.176708	0.177863	0.385591
187-1	seq15	0.258805	0.258149	0.260023	0.259047	0.260749	0.260687	0.422818
187-2	seq16	0.268579	0.273215	0.269705	0.273345	0.268529	0.271049	0.449692
188-1	seq17	0.174411	0.180165	0.17719	0.179143	0.176927	0.178142	0.386009
189-2	seq18	0.307941	0.31316	0.308067	0.313838	0.309187	0.312539	0.407185
190-1	seq19	0.180587	0.18643	0.183351	0.184852	0.182936	0.184404	0.384175
191-3	seq20	0.25457	0.251079	0.255093	0.251612	0.254628	0.258859	0.417992
192-2	seq21	0.283699	0.282714	0.284065	0.283766	0.284509	0.286218	0.405275
193-3	seq22	0.252339	0.258479	0.254781	0.257512	0.255142	0.256363	0.373859
194-1	seq23	0.2491	0.25323	0.249586	0.254204	0.250076	0.252405	0.411608
195-1	seq24	0.286718	0.281056	0.287452	0.282109	0.288139	0.28928	0.409224
196-2	seq25	0.299128	0.29795	0.299766	0.29906	0.300506	0.303323	0.407929
197-1	seq26	0.264869	0.265881	0.266124		0.267075	0.265785	0.397428
198-1R	seq27	0.27275	0.26976	0.27524	0.269327	0.274576	0.27398	0.384693
198-2W	seq28	0.263593	0.260522	0.266838				0.376524
199 (1)-2	seq29	0.26161						0.386666
199 (2)-3	seq30	0.267791	0.262722	0.26856			0.267318	0.394282
200-3	seq31	0.242664	0.23984	0.24541	0.238875	0.245382	0.245533	0.381943
200-4	seq32	0.240317	0.237495	0.243065	0.236526	0.242905	0.243178	0.378599
201-2	seq33	0.26652	0.271558	0.267783			0.269067	0.404715
202-1	seq34	0.244761	0.250834	0.247259	0.249864	0.247777	0.24856	0.379976
203-1	seq35	0.265929	0.261973	0.267488			0.2669	0.398461
203-2	seq36	0.264627	0.260783	0.266174				0.386535
204-1	seq37	0.211791	0.212501	0.213265			0.215416	0.391297
204-2	seq38	0.211863		0.212081				0.393274
205-1	seq39	0.215168	0.214763	0.215386			0.218652	0.390307
206-1	seq40	0.215522	0.215015	0.215639			0.218906	0.389618
207-2	seq41	0.215589	0.215184	0.215784				0.391146
208-3	seq42	0.21762	0.217896	0.219001			0.221122	0.392229
209-2	seq43	0.214171	0.213765	0.214389				0.396718
210-1	seq44	0.215032	0.214626	0.21525			0.21852	0.393195
211-1	seq45	0.223281		0.223813				

212-1	seq46	0.216034	0.215526	0.216402	0.217066	0.215252	0.219433	0.392435
213-1	seq47	0.215268	0.214886	0.215439	0.216422	0.214338	0.218746	0.391052
214-2	seq48	0.21493	0.214524	0.215148	0.216058	0.213978	0.218415	0.391754
215-1	seq49	0.215244	0.214838	0.215462	0.216372	0.214293	0.218729	0.390912
216-2	seq50	0.213822	0.213417	0.21404	0.214945	0.212872	0.217292	0.395119
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224-1	seq58	0.193866	0.199622	0.19671	0.198635	0.196649	0.197417	0.385171
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227-2	seq62	0.235038	0.234193	0.237863	0.233211	0.238761	0.23859	0.417449
227-3	seq63	0.234726	0.233706	0.237385	0.232719	0.238286	0.238112	0.417573
Gipsa W E07	seq64	0.282644	0.283963	0.282153	0.284484	0.282337	0.285546	0.456697
Gipsa W A07	seq65	0.005239	0.007574	0.006241	0.007717	0.006719	0.007542	0.321978
Gipsa W C08	seq66	0.00595	0.00708	0.005088	0.008425	0.004502	0.008257	0.322783
Alturas	seq67	0.377628	0.377551	0.376306	0.378802	0.378116	0.382222	0.459516
Skookum	seq68	0.319998	0.320252	0.320072	0.321666	0.318637	0.324906	0.333291
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Avocet_Yr5	seq73	0.719369	0.709033	0.71913	0.709846	0.716436	0.726255	0.723416
Madsen	seq74	0.649569	0.647975	0.649739	0.648788	0.64948	0.649635	0.67282
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Avocet	seq76	0.713329	0.700759	0.710411	0.70248	0.706638	0.72011	0.731377
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203-1	203-2	204-1	204-2	205-1	206-1	207-2	208-3	209-2
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IonaBlanca_Gra Avocet_Yr5 MadsenAvocet_Yr1 AvocetSolano W F Solano W E Solanoseq71seq72seq73seq74seq75seq76seq77seq78seq79

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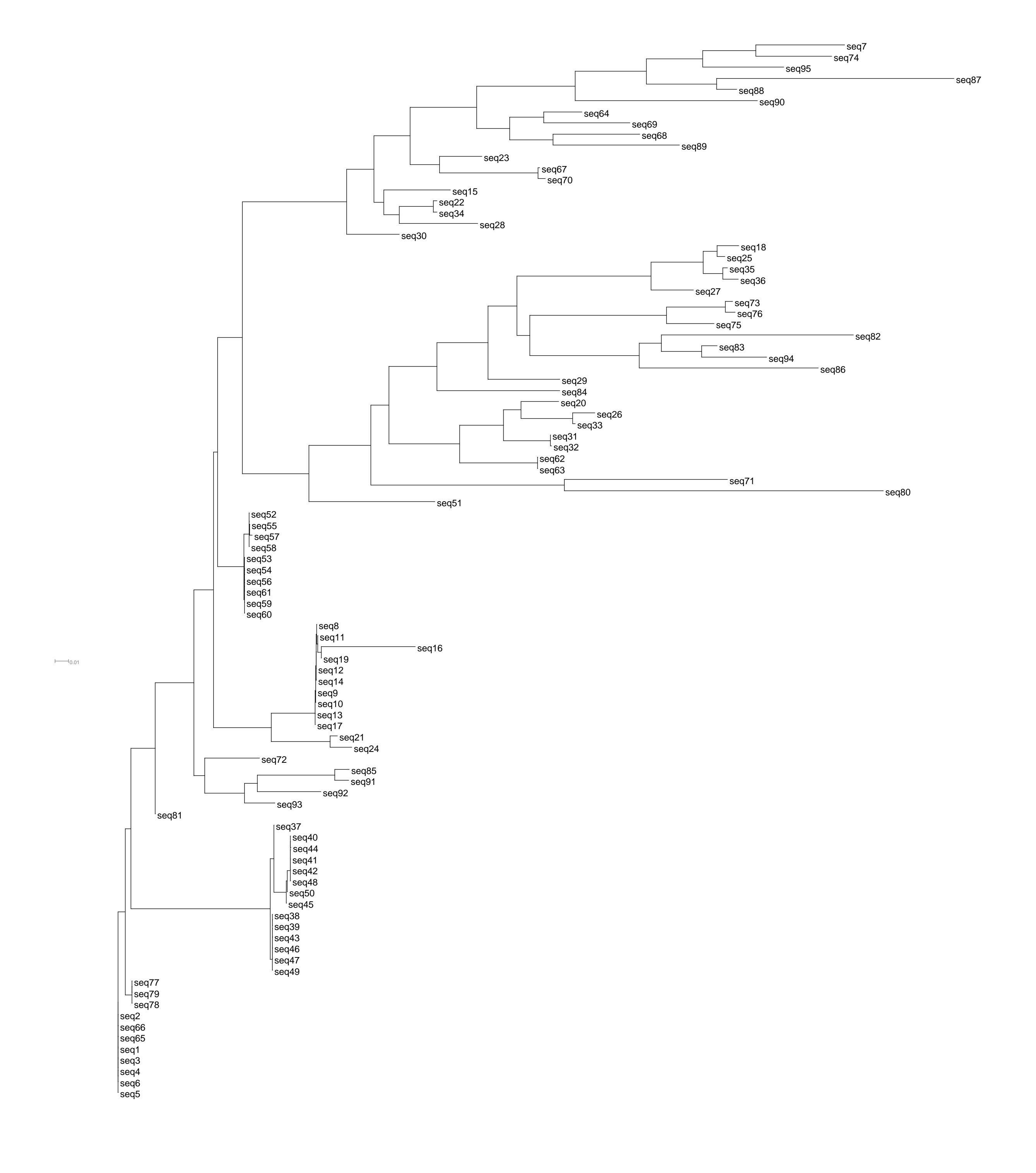
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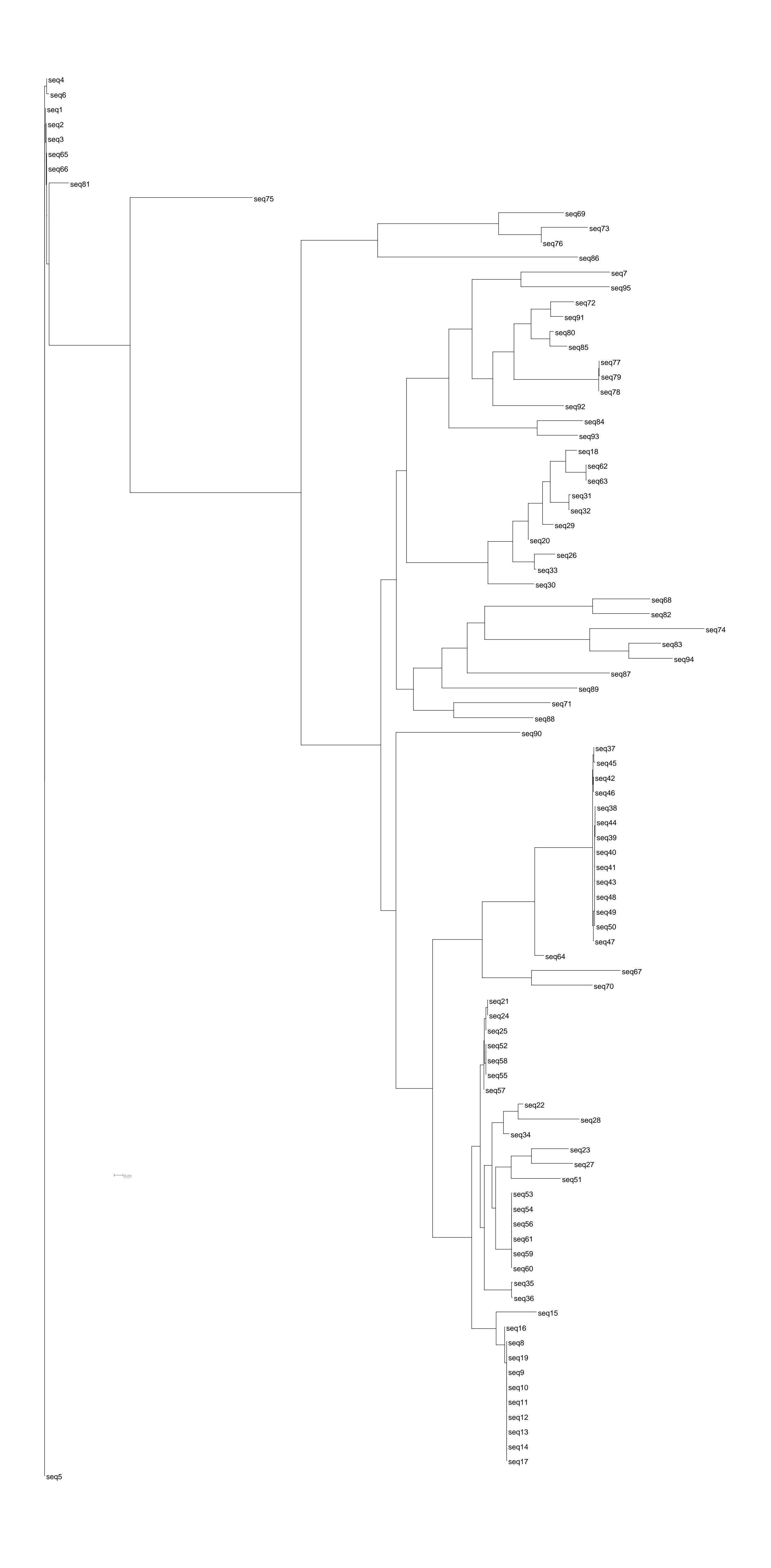
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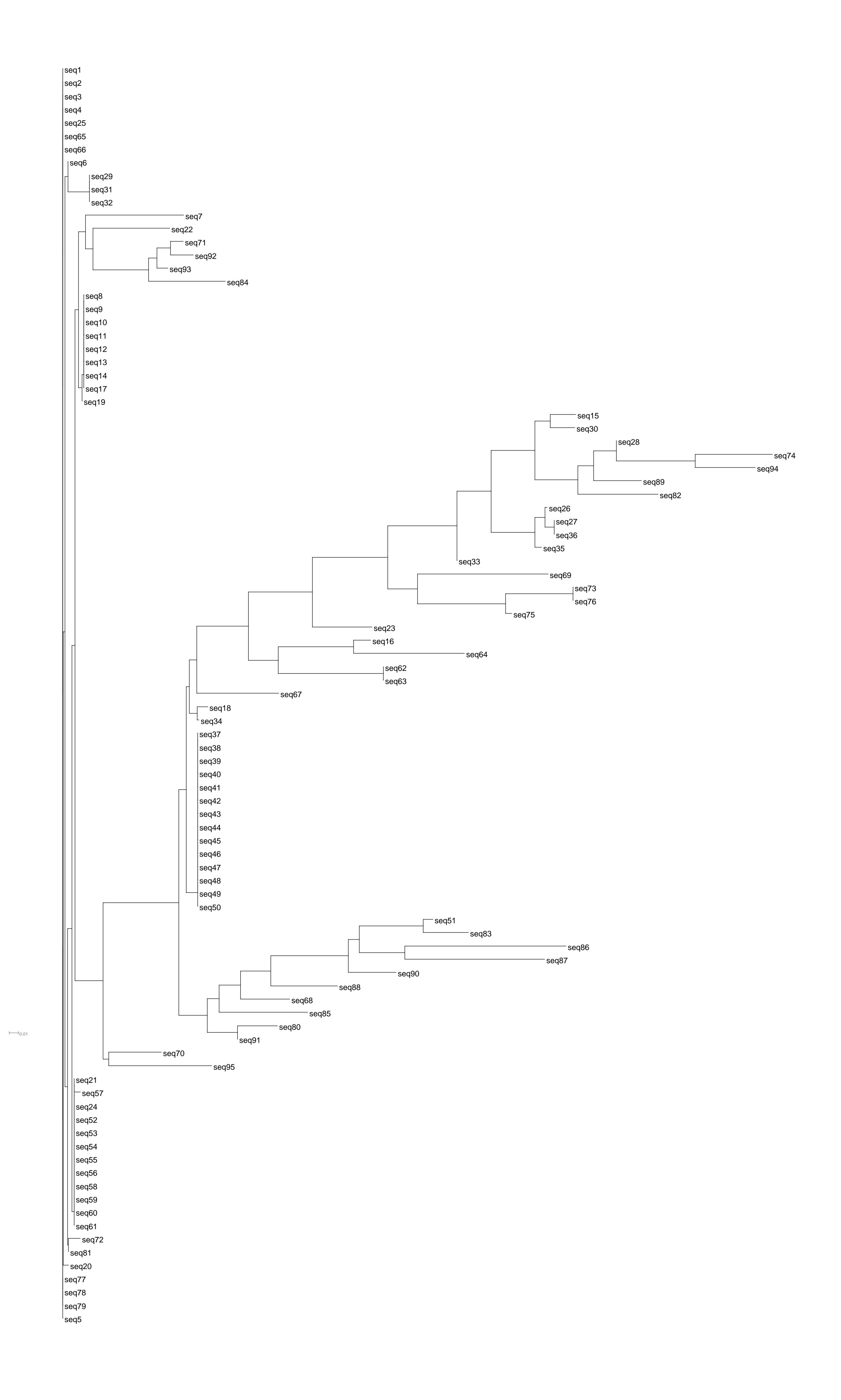
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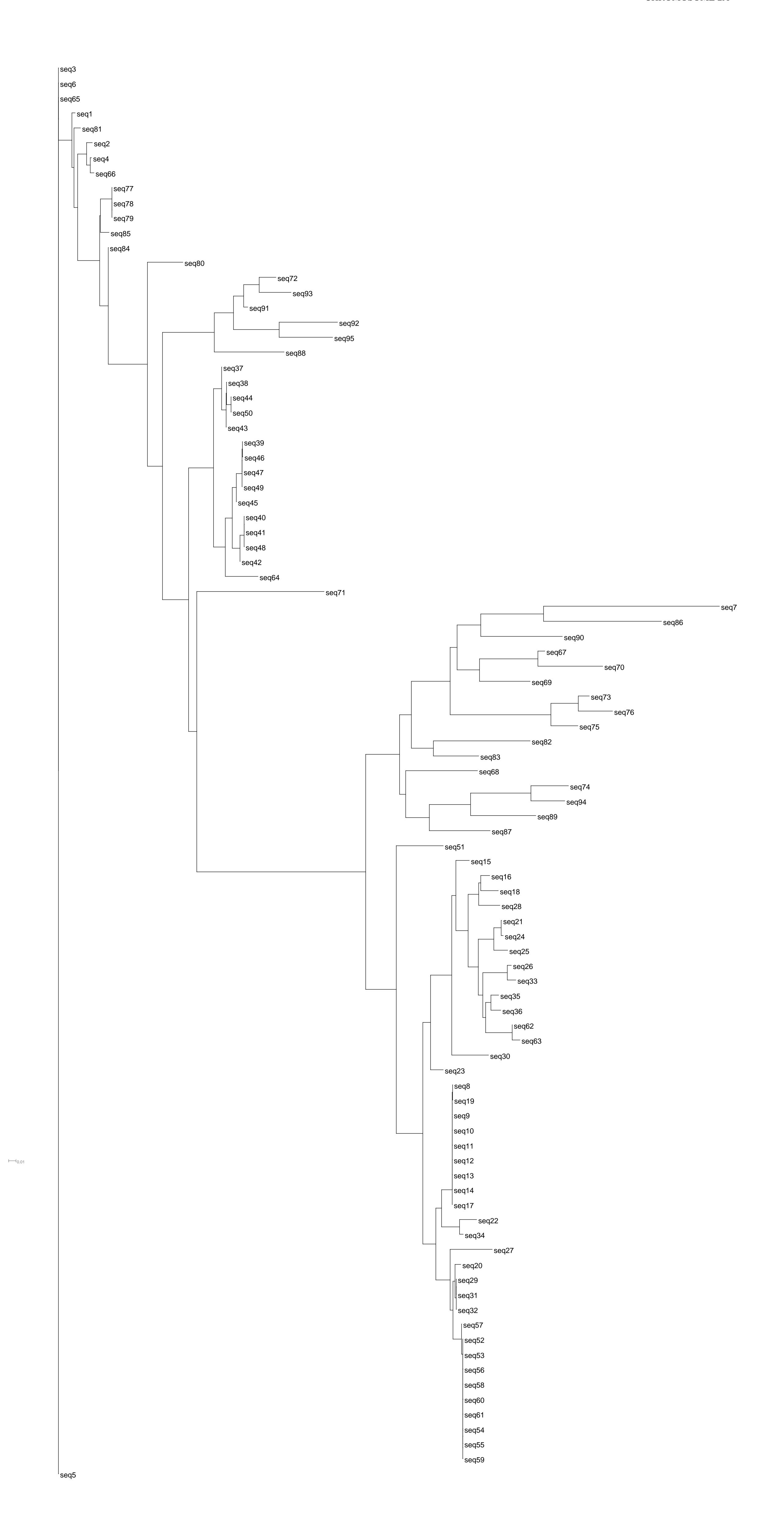
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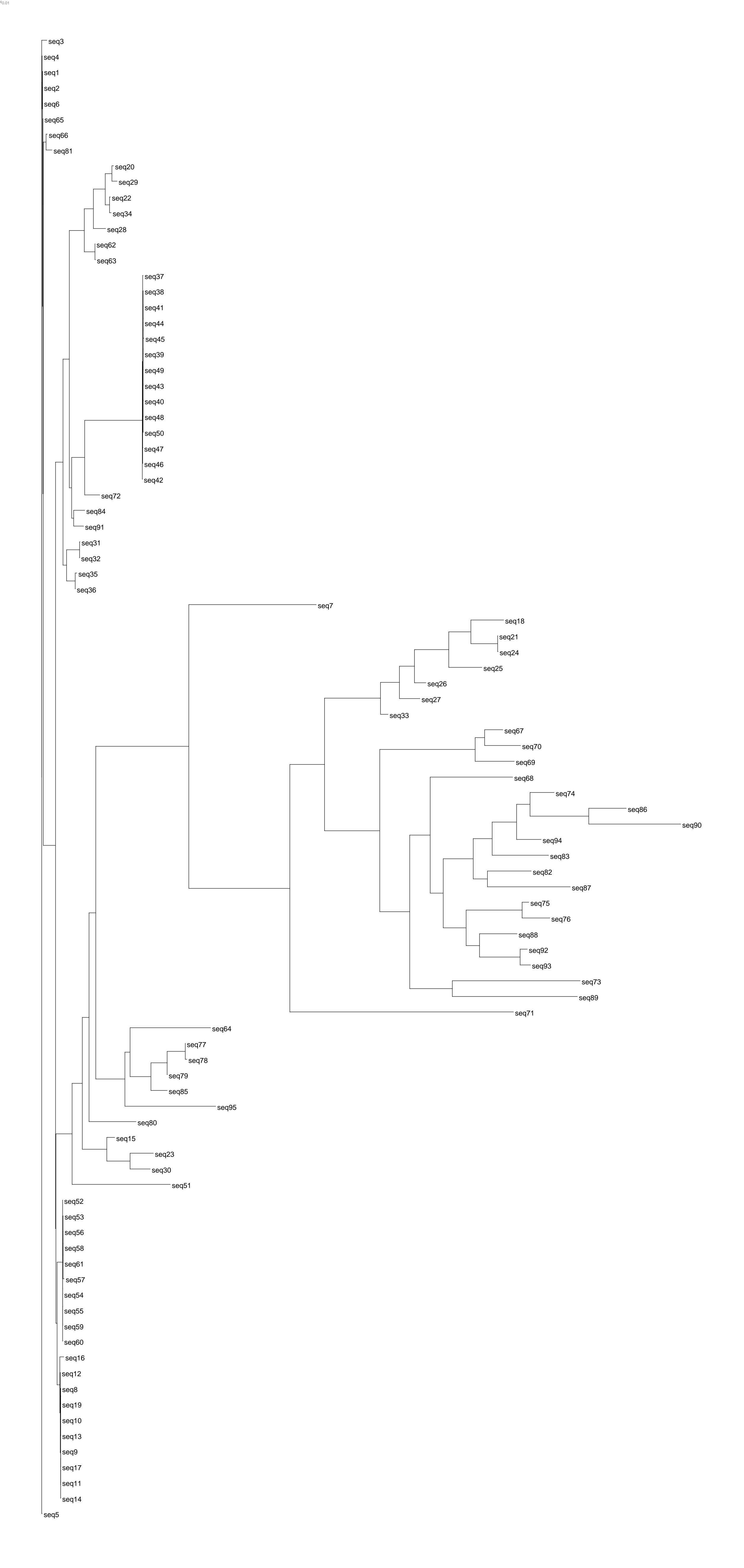


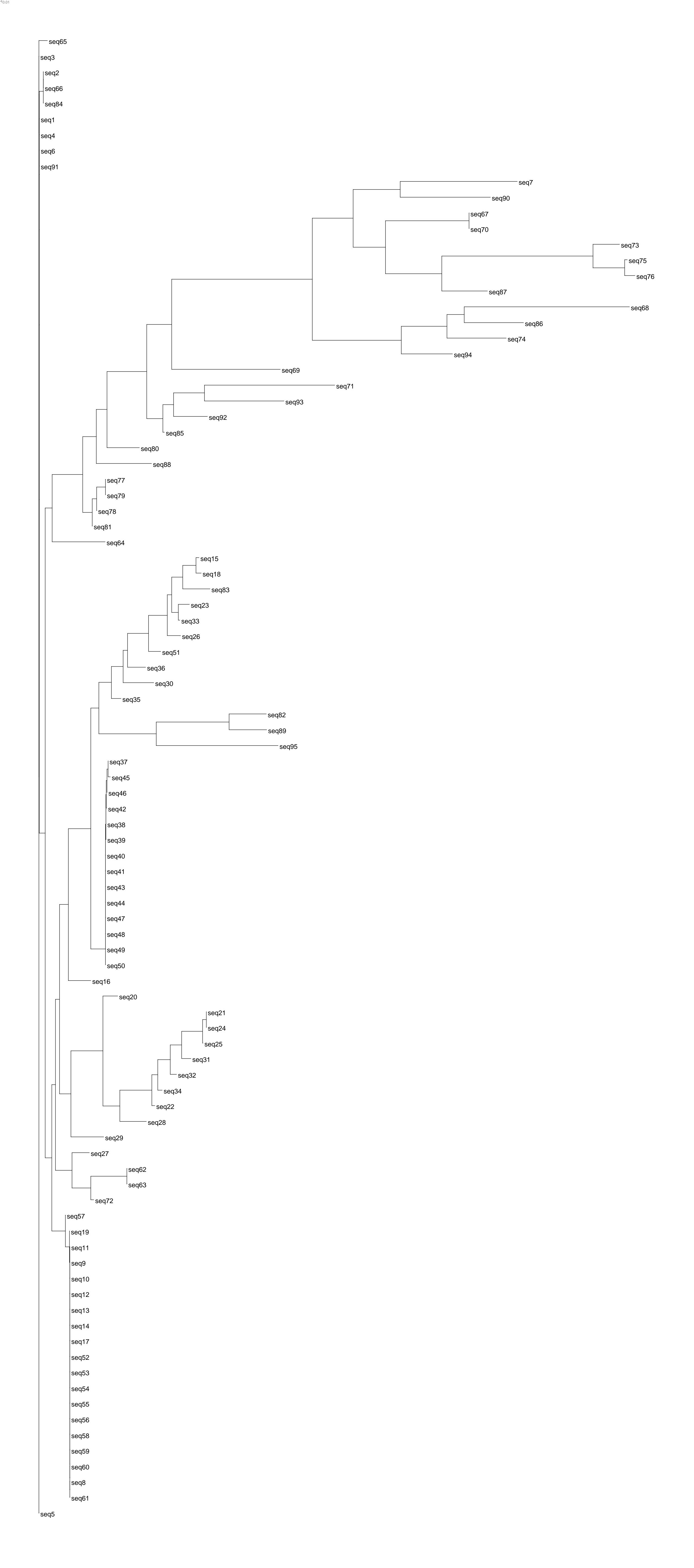






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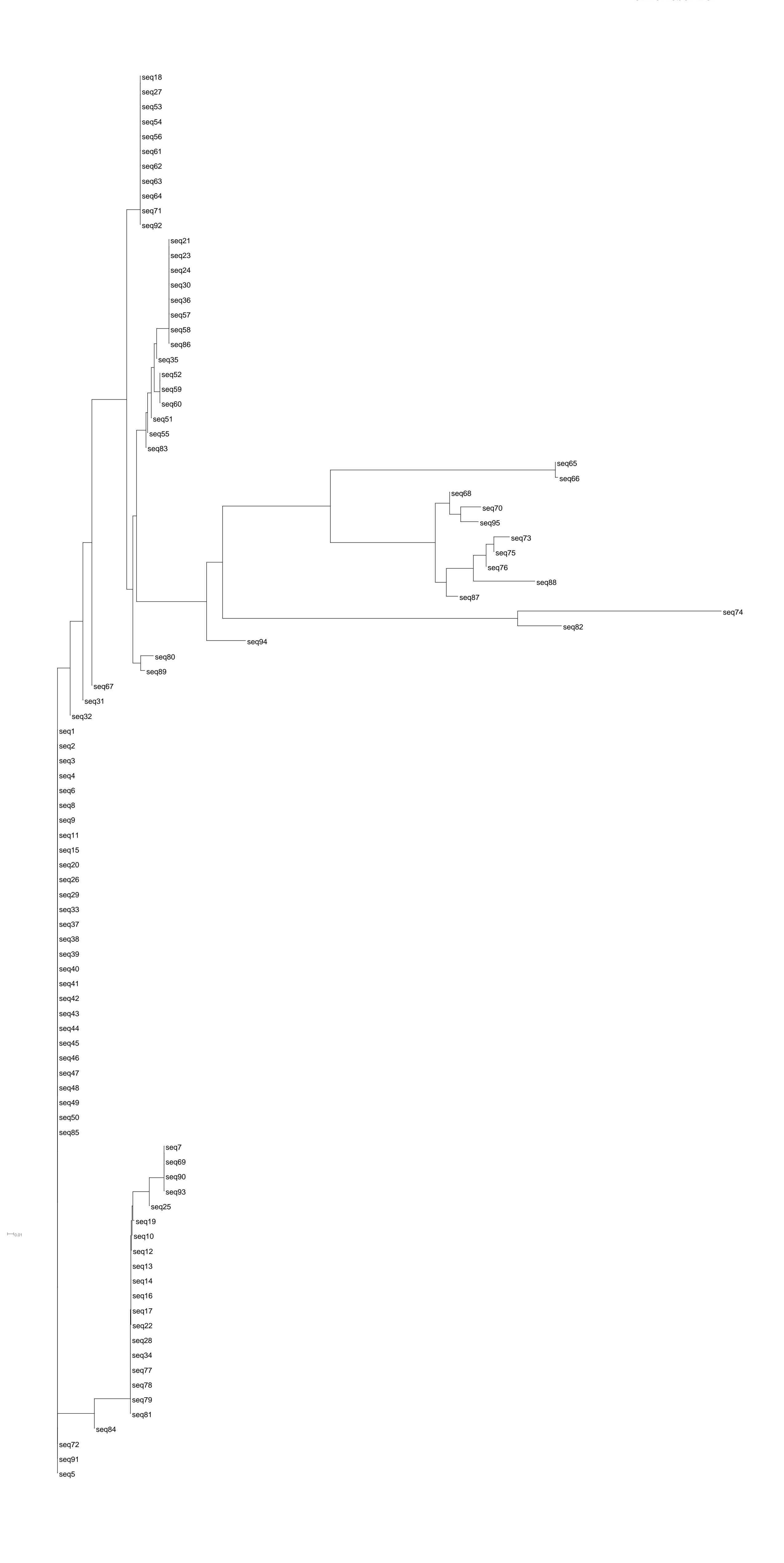


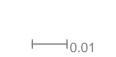


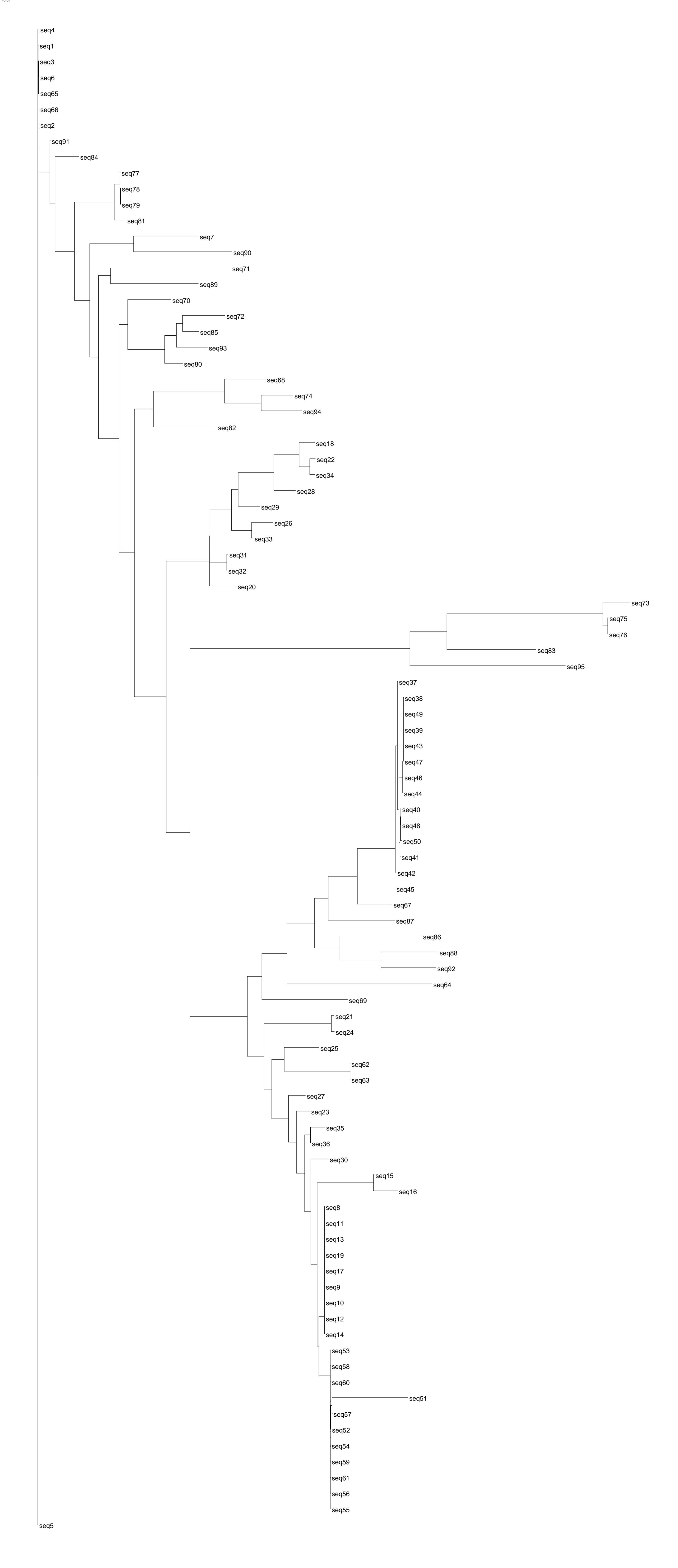






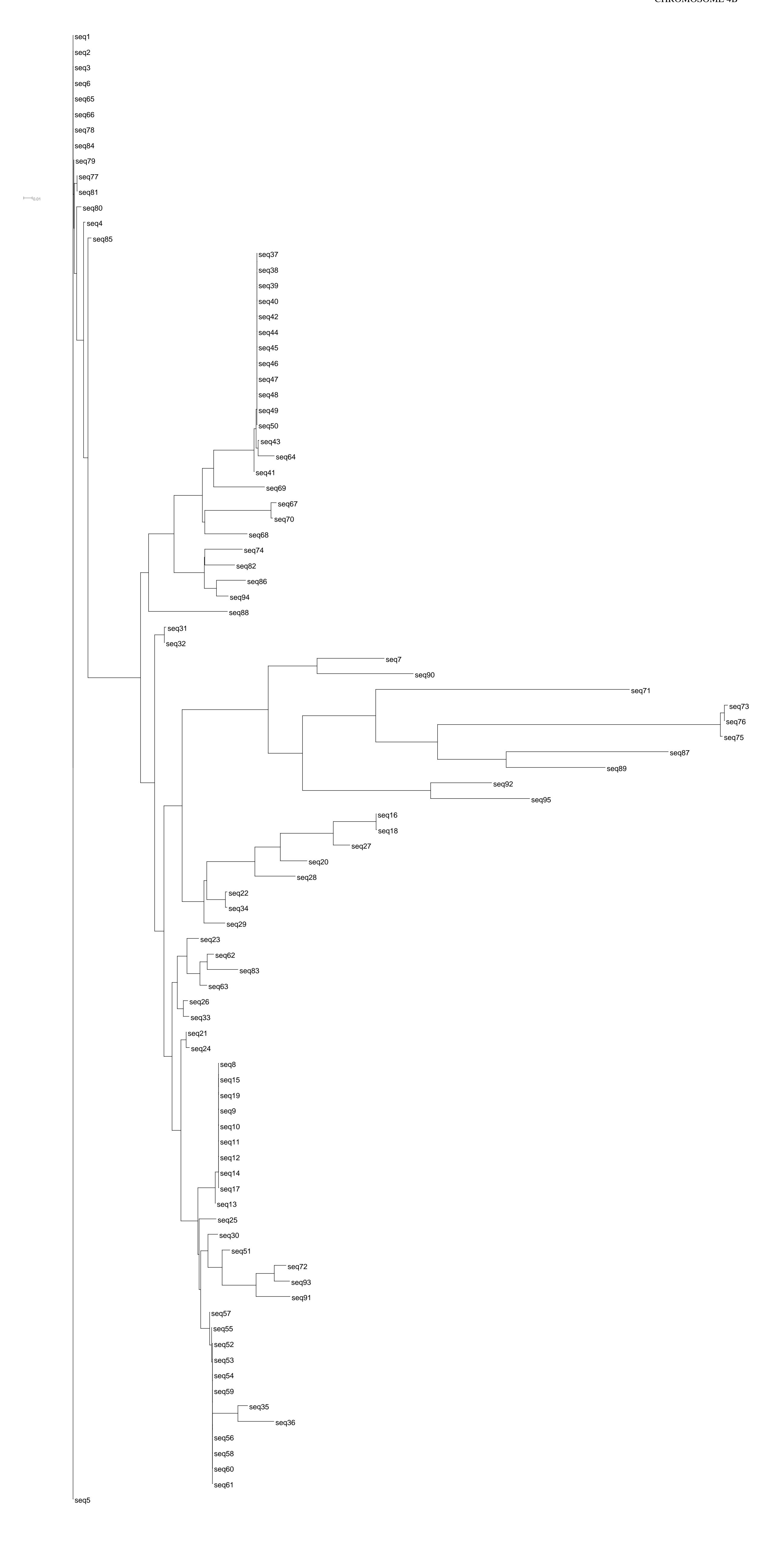


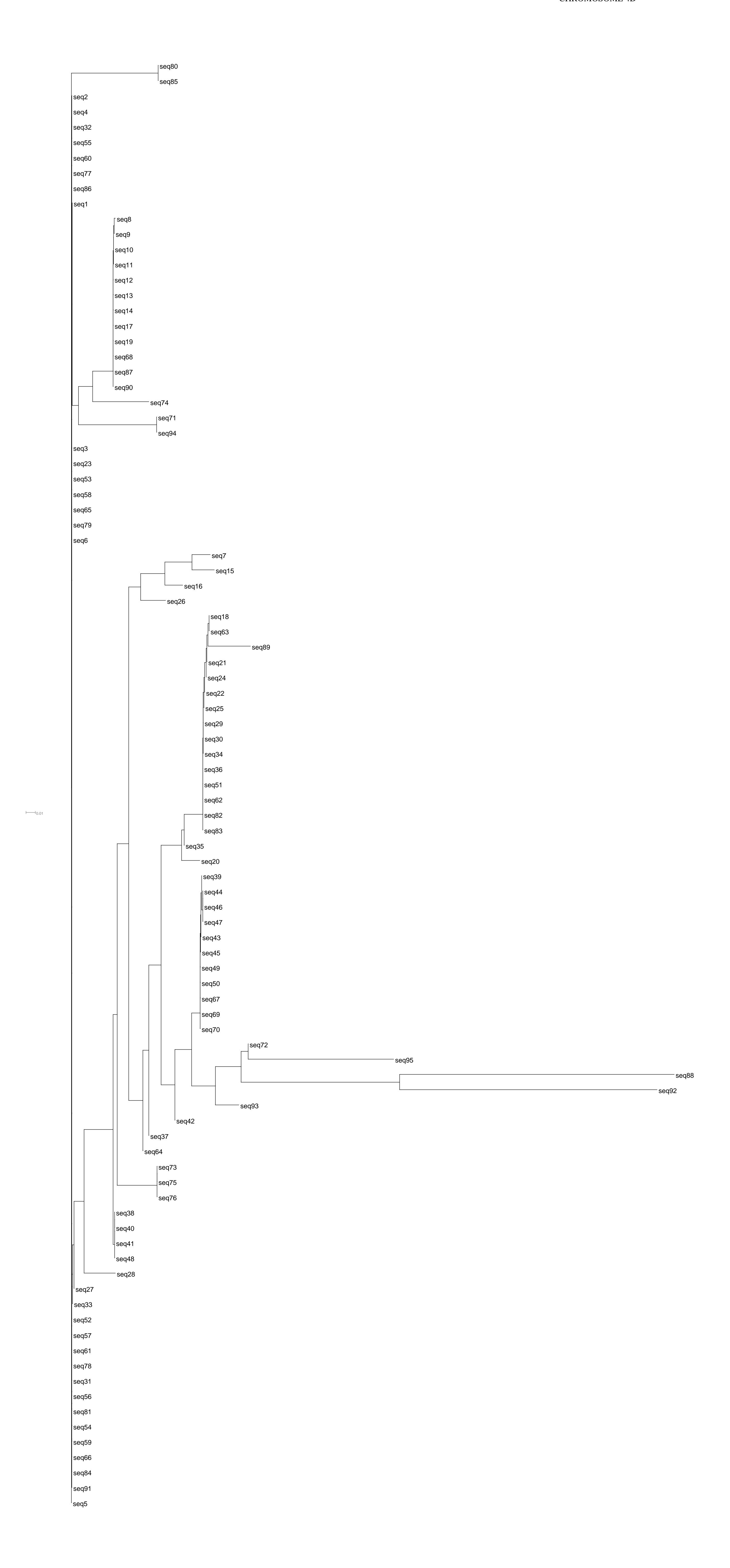




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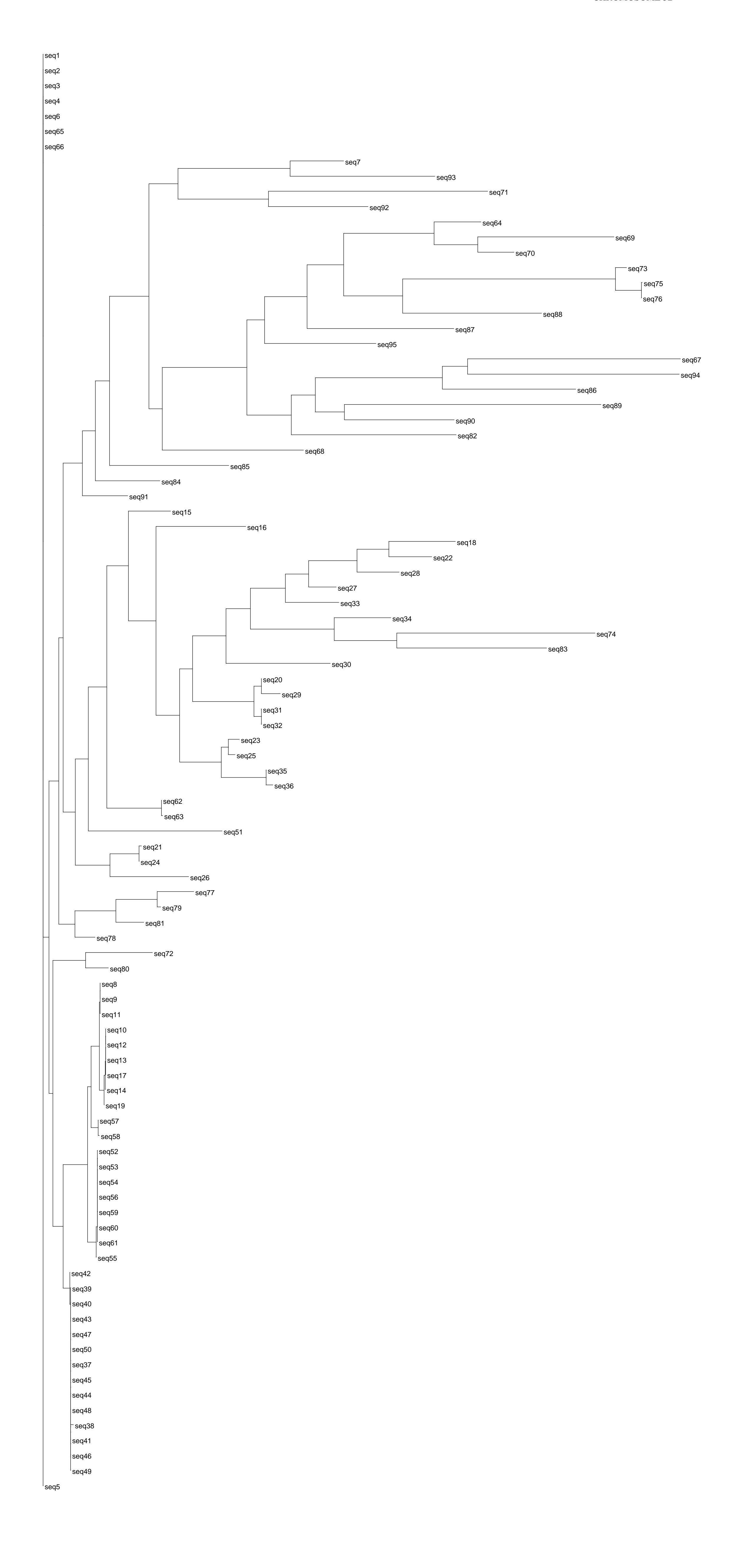




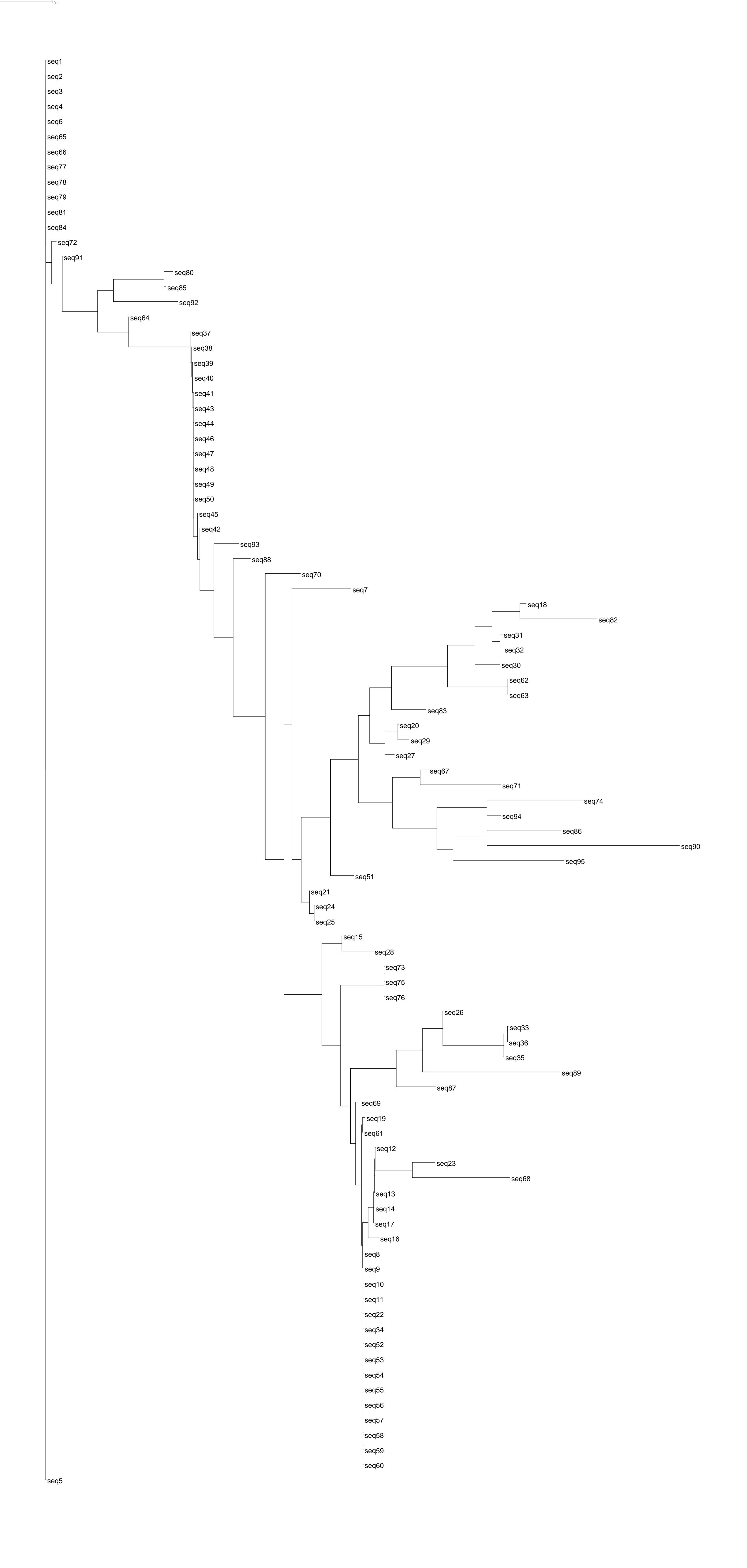
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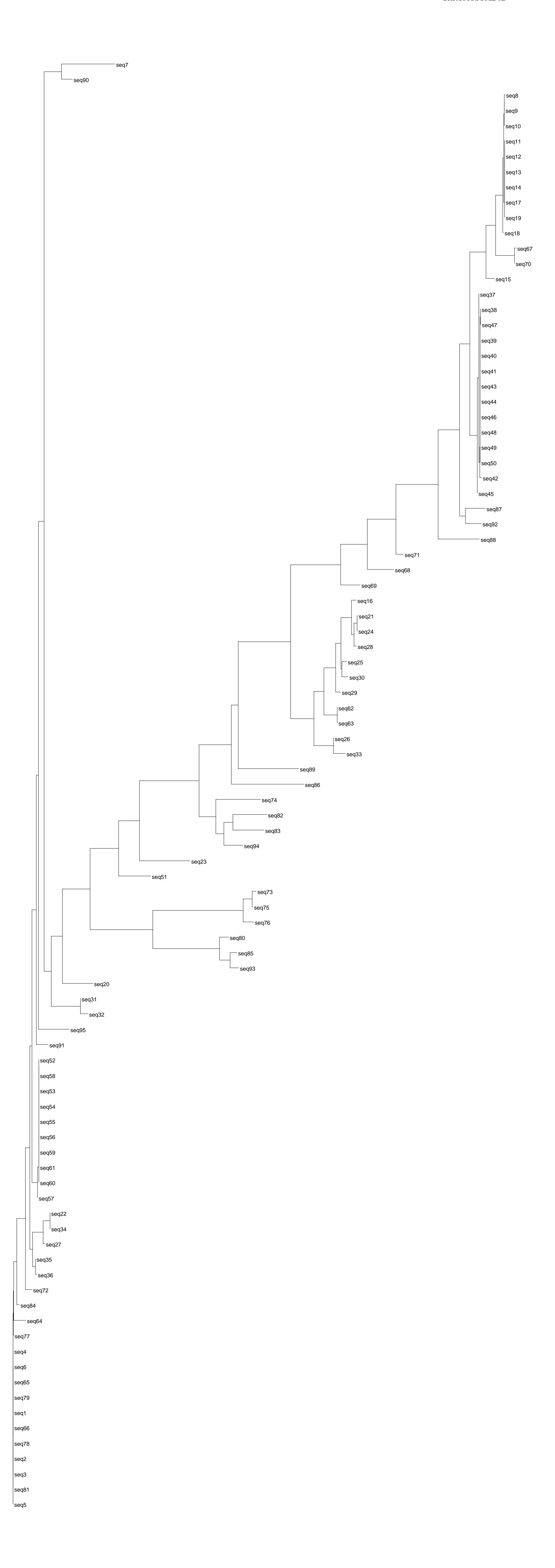


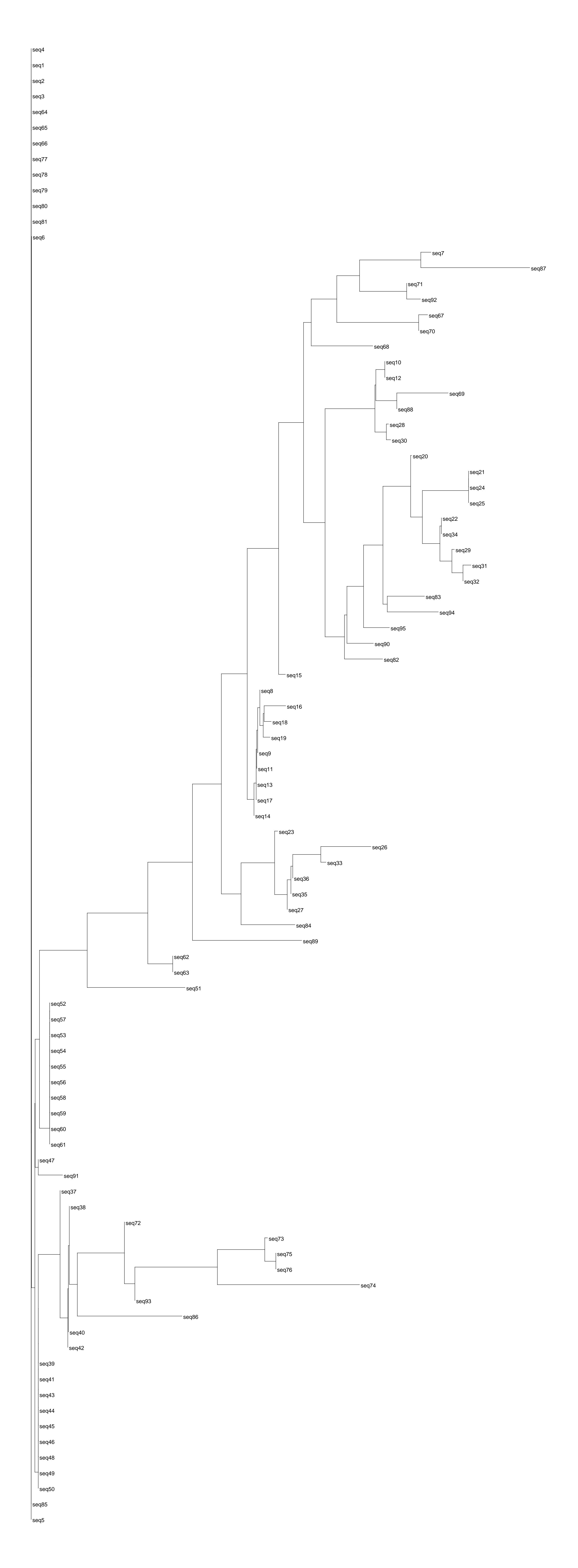
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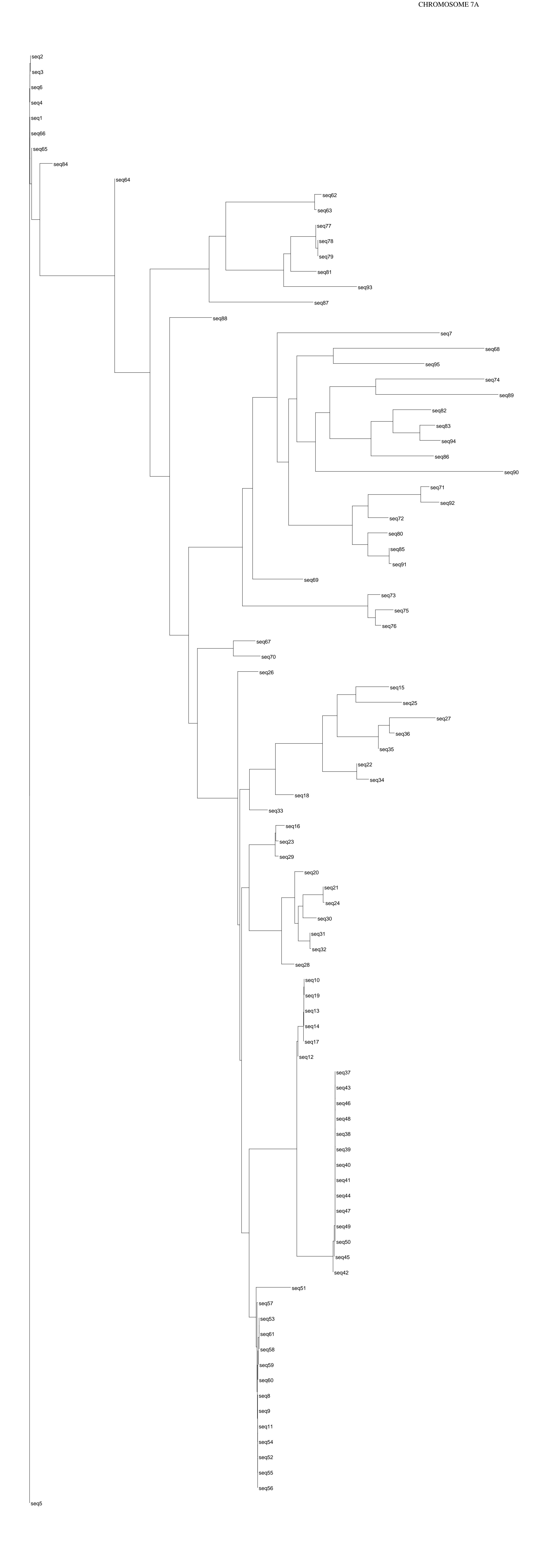


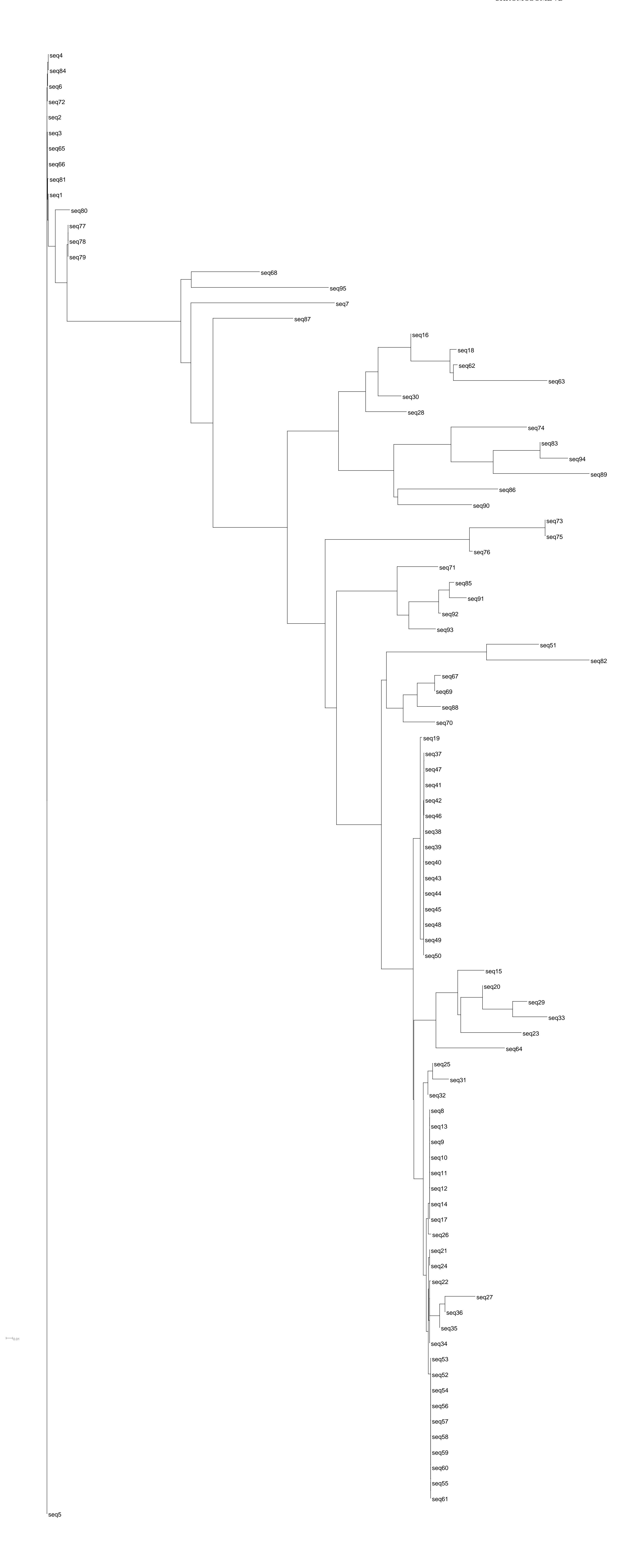


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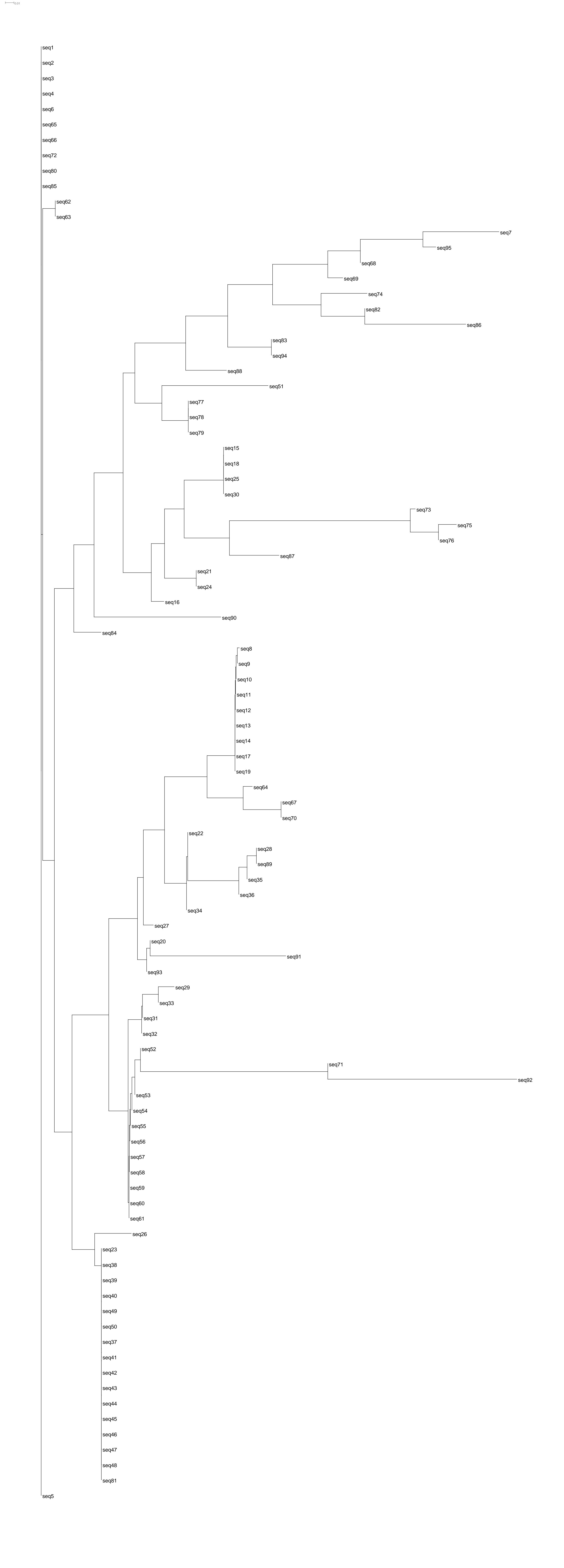


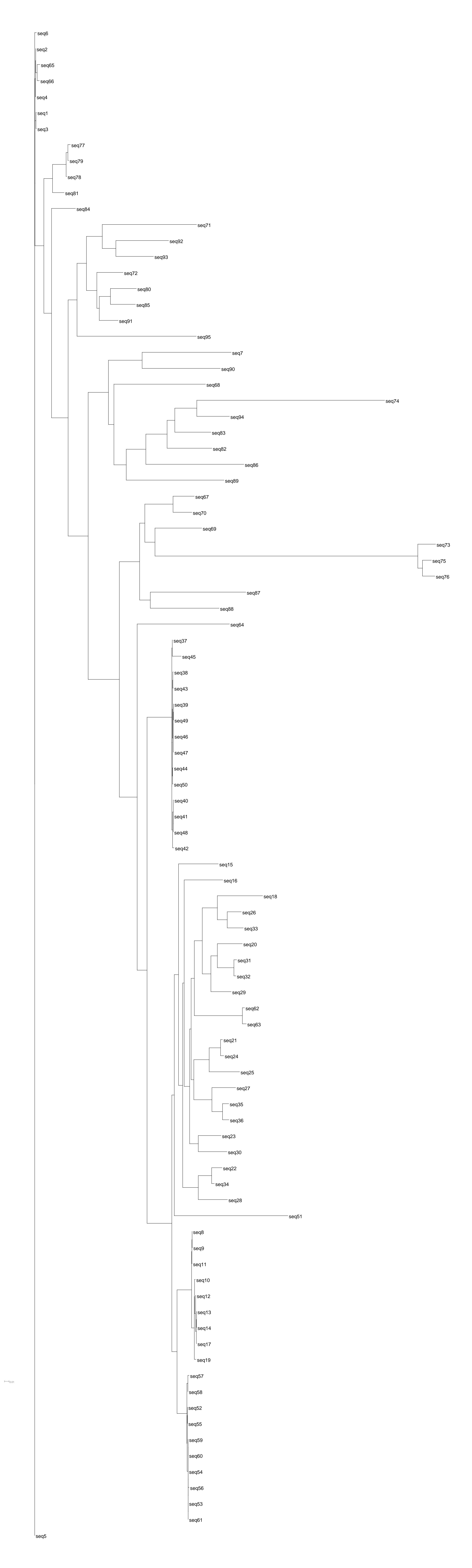






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189-2	seq11
190-1	seq12
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192-2	seq14
193-3	seq15
194-1	seq16
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196-2	seq18
197-1	seq19
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200-3	seq23
200-4	seq25
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227-3	seq56
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Express D03	seq59
Express D05	seq60
Expresso B03	seq61
Expresso B04	seq62
Gipsa W E07	seq63
Gipsa W A07	seq64
Gipsa W C08	seq65
Alturas	seq66
Skookum	seq67
Challis	seq68
UI_Cataldo	seq69
Iona	seq70
Blanca_Grande	seq71
Avocet_Yr5	seq72
Madsen	seq73
Avocet_Yr15	seq74
Avocet	seq75
Solano W H03	seq76
Solano W B04	seq77
Solano	seq78
WB cristallo	seq79
WB rockland	seq80
Rod	seq81
WB528	seq82
Patwin	seq83
Plata	seq84
Bobwhite	seq85
Eltan	seq86
Louise	seq87
Penewawa	seq88
Caledonia	seq89
Volt	seq90
Summit	seq91
Yecoro Rojo	seq92
Cabernet	seq93

Mohler seq94 Declo seq95

A REPORT OF THE

NATIONAL SMALL GRAIN VARIETY REVIEW BOARD



ASSOCIATION OF OFFICIAL SEED CERTIFYING AGENCIES

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NATIONAL SMALL GRAIN VARIETY REVIEW BOARD

ASSOCIATION OF OFFICIAL SEED CERTIFYING AGENCIES May 2006

The Association of Official Seed Certifying Agencies (AOSCA), National Small Grain Variety Review Board (NSGVRB), review the following varieties on February 21, 2006, in Manhattan, Kansas. The Board recommended the inclusion of these varieties for certification. Seed of these varieties may be certified, providing production meets all standards of the Certifying Agency of the state in which the seed is grown.

All variety information, including descriptions, claims and research data to support any claim was supplied to the NSGVRB by the applicants. The NSGVRB makes judgment regarding recommendation of varieties for inclusion in certification based on the data supplied. Beyond that, the NSGVRB takes no position on the accuracy or truthfulness of any description or claim made by the applicants.

Further information on current procedures, application forms and detail regarding the NSGVRB can be obtained from:

Chet Boruff, Chief Executive Officer Association of Official Seed Certifying Agencies 1601 52nd Ave., Ste 1 Moline, IL 61265

Phone: 309-736-0120 Fax: 309-736-0115 E-Mail: cboruff@aosca.org

Respectfully submitted,

Daryl Strouts, Chairman

National Small Grains Variety Review Board

Dayl Strouts

Association of Official Seed Certifying Agencies National Small Grain Variety Review Board

WHEAT VARIETIES RECOMMENDED FOR CERTIFICATION 2006

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Kelby Hard Red Spring Wheat

AOSCA

Kelby is a hard red spring wheat bred and developed by AgriPro under the experimental designation of W98S0113-20 intended for grain production. Kelby originated from the cross "N97-0117/3/N92-0098//Sumai 3/Dalen" which was made in Berthoud, CO during the fall crossing session of 1997. Its pedigree consists of AgriPro hard red spring experimental lines and Sumai 3. Sumai 3 is a Chinese wheat used for its fusarium head blight tolerance. Single heads were selected from the F2 population of this cross at Casselton, ND during the 1998 season. Selections were based on height, leaf rust and scab tolerance. Kelby is a semidwarf variety and has very good lodging resistance. It has early maturity and very good test weight. It has very good protection to the prevalent races of leaf rust and to foliar diseases. This variety was intended as a bread wheat and has high protein and satisfactory breadmaking characteristics. Kelby is broadly adapted to the spring wheat growing areas of the northern plains.

Juvenile growth habit is erect. Plant color at boot stage is green. Flag leaf at boot stage is recurved and twisted. Waxy bloom is present on the head, stem and flag leaf sheath. Anther color is yellow. Head shape is tapering, middense and awned. Glumes are glabrous, midwide in width and short in length with oblique shoulders and acuminate beaks. Seed shape is ovate. Brush hairs are medium in length and occupy a large area of the seed tip. Seed crease depth is middeep and width is midwide. Seed cheeks are angular.

Kelby will be maintained by Agripro, in Berthoud, Colorado by the head row method. These heads are compared to the morphological characteristics for the variety and any variant rows are discarded. These head rows are then individually harvested and grown as progeny plots. The selected progeny plots are bulked to produce Breeders seed. Generations of Kelby, which may be multiplied, will be limited to Breeders seed, Foundation, Registered and Certified.

Kelby has been uniform and stable since 2004. About 0.8% of the plants were rogued from the initial Breeder's seed increase in 2001. Approximately 90% of the rogued variant plants were taller height wheat plants (5 to 15 cm.) and approximately 10% were awnletted wheat plants. Up to 0.8% variant plants may be encountered in subsequent generations.

AgriPro maintains seed stock and certified classes of Foundation, Registered and Certified. Certified seed stocks of Kelby will be available in the spring of 2006. Certified acreage is not to be published by AOSCA and certifying agencies. Plant Variety Protection is anticipated and Kelby may only be sold as a class of certified seed.

COKER 9553 Soft Red Winter Wheat

COKER 9553 (D00*6847-2) is a soft red winter wheat bred and developed by AgriPro for grain production. The single cross that produced COKER 9553, (aka. D00*6874-2), "89M-4035A/Pioneer 2580" was made in the 1993 spring greenhouse at Brookston, IN. COKER 9553 is a medium height wheat with medium-early season heading. This variety is intended for grain production with grain yield data that indicates it is adapted to most of the midsouthern and southeastern soft wheat areas. COKER 9553 has shown moderate-to-good resistance to field races of Stripe Rust.

Juvenile growth habit is semierect. Plant color at boot stage is dark green. Flag leaf at boot stage is erect and twisted. Waxy bloom is present on the head, stem and flag leaf sheath. Anther color is yellow. Head shape is strap, middense and awned. Glumes are glabrous, midwide in width and short in length with oblique shoulders and acute beaks. Seed shape is ovate. Brush hairs are long in length and occupy a large area of the seed tip. Seed crease depth is shallow and width is narrow. Seed cheeks are rounded.

COKER 9553 will be maintained by AgriPro in Berthoud, Colorado by the head row method. These heads are compared to the morphological characteristics for the variety and any variant rows are discarded. These head rows are then individually harvested and grown as progeny plots. The selected progeny plots are bulked to produce Breeders seed. Generations of COKER 9553, which may be multiplied, will be limited to Breeders seed, Foundation, Registered and Certified.

COKER 9553 has been uniform and stable since 2004. Less than 0.8% of the plants were rogued from the Breeders Seed increase in 2005. Approximately 90% of the rogued variant plants were taller height wheat plants (8 to 15 cm) and 5% were awnletted plants and 5% were bronze chaffed wheat plants. Up to 0.8% variant plants may be encountered in subsequent generations.

AgriPro maintains seed stock and certified classes of Foundation, Registered and Certified. Certified seed stocks of COKER 9553 will be available in the fall of 2006. Certified acreage is not to be published by AOSCA and certifying agencies. Plant Variety Protection is anticipated and COKER 9553 may only be sold as a class of certified seed.

NuDakota Hard White Winter Wheat

NuDakota (BC97ROM-50W) is a hard white winter wheat developed by Agripro for grain production. NuDakota is derived from a bulk population derived from the cross Jagger/Romanian Bulk. NuDakota is a medium height semidwarf variety, awned and has yellow chaff at maturity. It has medium late maturity and excellent straw strength. It has erect plant type, erect flag leaves and the spikes are upright at maturity. NuDakota is resistant to current central plains field races of stem rust, stripe rust and leaf rust. It is resistant to wheat soil-borne mosaic virus and moderately resistant to wheat streak mosaic virus and wheat spindle streak mosaic virus. NuDakota is moderately resistant to speckled leaf blotch and tan spot. NuDakota is best adapted to the northern high plains north of interstate 80.

Juvenile growth habit is semi-erect. Auricle anthocyanin and auricle hairs are present. Plant color at boot stage is dark green. Anther color is yellow. Flag leaf is erect and twisted at boot stage. Head shape is strap and awned. Glume shoulder shape is oblique with an acuminate beak. Glume length is midlong and glume width is midwide. Chaff color is yellow at maturity. Seed shape is elliptical with long brush hairs that occupy a large area. Seed crease depth is shallow and seed crease width is narrow. Seed cheeks are rounded.

NuDakota will be maintained by Agripro Wheat, in Berthoud, Colorado by the head row method. These heads are compared to the morphological characteristics for the variety and any variant rows are discarded. These head rows are then individually harvested and grown as progeny plots. The selected progeny plots are bulked to produce Breeders seed. Generations of NuDakota, which may be multiplied, will be limited to Breeders seed, Foundation, Registered and Certified.

NuDakota has been uniform and stable since 2004. Less than 0.8% of the plants were rogued from the Breeders seed increase in 2005. Approximately 90% of the rogued variant plants were taller height wheat plants (8 to 15 cm), 5% were awnless wheat plants and 5% were bronze chaffed wheat plants. Up to 1% variant plants may be encountered in subsequent generations. A red seed variant has been identified in the Breeders seed and production plots and up to 0.8% may be encountered in subsequent generations.

AgriPro Wheat maintains seed stock and certified classes of Foundation, Registered and Certified. Registered and Foundation seed stocks of NuDakota will be available in the fall of 2006. Certified acreage is not to be published by AOSCA and certifying agencies. Plant Variety Protection is anticipated and NuDakota may only be sold as a class of certified seed

NuGrain Hard White Winter Wheat

NuGrain is a hard white winter wheat variety developed by AgriPro for grain production. NuGrain is a cross between Platte/W92-456W (exp. designation 96x530W). It is a medium height semidwarf variety, awned and has yellow chaff at maturity. It has medium late maturity, similar to NuHills and excellent straw strength. It has Septoria triticii and tan spot tolerance. It has shown resistance to central plains races of leaf rust and stem rust. It is intermediate in reaction to stripe rust. It is susceptible to Hessian Fly. NuGrain has been shown to have equal milling and baking characteristics when compared to NuHills and Platte. NuGrain is high in polyphenyol oxidase. NuGrain has intermediate pre-harvest sprouting tolerance, similar to NuHills. NuGrain is adapted to western Kansas, eastern Colorado and southwestern Nebraska.

Juvenile growth habit is semi-erect. Auricle anthocyanin and auricle hairs are present. Plant color at boot stage is blue green. Anther color is yellow. Flag leaf is erect and twisted at boot stage. Head shape is strap and awned. Glume shoulder shape is oblique with an acuminate beak. Glume length is medium and glume width is midwide. Chaff color is yellow at maturity. Seed shape is ovate. Seed crease depth is shallow and seed crease width is narrow. Seed cheeks are rounded.

NuGrain will be maintained by Agripro, in Berthoud, Colorado by the head row method. These heads are compared to the morphological characteristics for the variety and any variant rows are discarded. These head rows are then individually harvested and grown as progeny plots. The selected progeny plots are bulked to produce Breeders seed. Generations of NuGrain, which may be multiplied, will be limited to Breeders seed, Foundation, Registered and Certified.

NuGrain has been uniform and stable since 2002. Less than 0.8% of the plants were rogued from the Breeders seed increase in 2003. Approximately 90% of the rogued variant plants were taller height wheat plants (8 to 15 cm). Up to 1% variant plants may be encountered in subsequent generations. A red seed variant has been identified in the Breeders seed and production plots and up to 0.8% may be encountered in subsequent generations.

AgriPro maintains seed stock and certified classes of Foundation, Registered and Certified. Foundation and Registered seed stocks of NuGrain will be available in the fall of 2006. Certified acreage is not to be published by AOSCA and certifying agencies. Plant Variety Protection is anticipated and NuGrain may only be sold as a class of certified seed.

Platte2 Hard White Winter Wheat

Platte2 is a hard white winter wheat variety developed by AgriPro for grain production. Platte2 is a cross between Platte/W92-456W. It is a medium height semidwarf variety, awned and has yellow chaff at maturity. It has medium late maturity, similar to Platte and excellent straw strength. Platte2. It was selected as an improvement over the variety Platte it has smaller head size but greater numbers of tillers. It has improved Septoria triticii and tan spot tolerance over Platte. Improved stripe rust tolerance and better dryland grain yield performance. Platte2 has been shown to have equal milling and baking characteristics when compared to Platte.

Platte2 is best adapted to both irrigated and dryland regions of the western high plains, including western Kansas, eastern Colorado and the panhandle of Nebraska.

Platte2 is resistant to field races of leaf rust and stem rust. It is moderately susceptible to stripe rust. It has intermediate tolerance to Septoria triticii and tan spot and Hessian Fly.

Juvenile growth habit is semi-erect. Auricle anthocyanin and auricle hairs are present. Plant color at boot stage is blue green. Anther color is yellow. Flag leaf is erect and twisted at boot stage. Head shape is tapering and awned. Glume shoulder shape is oblique with an acuminate beak. Glume length is short and glume width is narrow. Chaff color is yellow at maturity. Seed shape is ovate with short brush hairs that occupy a midsize area. Seed crease depth is shallow and seed crease width is narrow. Seed cheeks are rounded.

Platte2 has been uniform and stable since 2004. Less than 0.8% of the plants were rogued from the Breeders seed increase in 2005. Approximately 90% of the rogued variant plants were taller height wheat plants (8 to 15 cm), 5% were awnless wheat plants and 5% were bronze chaffed wheat plants. Up to 0.8% variant plants may be encountered in subsequent generations. A red seed variant has been identified in the Breeders seed and production plots and up to 0.8% may be encountered in subsequent generations.

Platte2 will be maintained by Agripro, in Berthoud, Colorado by the head row method. These heads are compared to the morphological characteristics for the variety and any variant rows are discarded. These head rows are then individually harvested and grown as progeny plots. The selected progeny plots are bulked to produce Breeders seed. Generations of Platte2, which may be multiplied, will be limited to Breeders seed, Foundation, Registered and Certified.

AgriPro maintains seed stock and certified classes of Foundation, Registered and Certified. Registered and Foundation seed stocks of Platte2 will be available in the fall of 2006. Certified acreage is not to be published by AOSCA and certifying agencies. Plant Variety Protection is anticipated and Platte2 may only be sold as a class of certified seed.

Post Rock Hard Red Winter Wheat

Postrock is a hard red winter wheat developed by AgriPro for grain production. It was evaluated and tested under the experimental designations BC85811-7-4 and W03-20. Postrock is derived from the cross Ogallala/KSU94U261//Jagger made by Kansas State University in 1995. All selections and evaluations were done by AgriPro. Postrock has been evaluated in AgriPro, USDA regional and State Variety yield trials from 2002-2005. It has been stable and uniform since 2004. Postrock is a tall semidwarf variety in plant height, awned and has brown chaff at maturity. It has medium maturity and excellent straw strength. It has erect flag leaves and the spikes are mid-dense at maturity. Postrock is resistant to current central plains field races of stem rust, stripe rust and leaf rust. It is resistant to wheat soil-borne mosaic virus and moderately resistant to wheat streak mosaic virus and intermediate in response to wheat spindle streak mosaic virus. Postrock is moderately resistant to Speckled leaf blotch and tan spot. It is moderately susceptible to powdery mildew, and is susceptible to Hessian Fly. Postrock is best adapted to the central and western high plains south of interstate 80.

Juvenile growth habit is semi-erect. Auricle anthocyanin and auricle hairs are present. Plant color at boot stage is dark green. Anther color is yellow. Flag leaf is erect and twisted at boot stage. Head shape is tapering and awned. Glume shoulder shape is square with an acuminate beak. Glume length is midlong and glume width is midwide. Chaff color is bronze at maturity. Seed shape is ovate with medium length brush hairs that occupy a large area of the seed tip. Seed crease depth is shallow and seed crease width is narrow. Seed cheeks are rounded.

Postrock will be maintained by AgriPro Wheat, in Berthoud, Colorado by the head row method. These heads are compared to the morphological characteristics for the variety and any variant rows are discarded. These head rows are then individually harvested and grown as progeny plots. The selected progeny plots are bulked to produce Breeders seed. Generations of Postrock, which may be multiplied, will be limited to Breeders seed, Foundation, Registered and Certified.

Postrock has been uniform and stable since 2004. Less than 0.8% of the plants were rogued from the Breeders seed increase in 2005. Approximately 80% of the rogued variant plants were taller height wheat plants (8 to 15 cm), 5% were white chaffed wheat plants and 5% were awnless wheat plants. Up to 0.8% variant plants may be encountered in subsequent generations.

AgriPro Wheat maintains seed stock and certified classes of Foundation, Registered and Certified. Foundation and Registered seed stocks of Postrock will be available in the fall of 2006. Certified acreage is not to be published by AOSCA and certifying agencies. Plant Variety Protection is anticipated and Postrock may only be sold as a class of certified seed.

AgriPro Paladin Hard Red Winter Wheat

AgriPro Paladin is a hard red winter wheat bred and developed by AgriPro and tested under the experimental designation of W96-355 intended for grain production. AgriPro Paladin was an F3 derived, single plant selection from the cross: WI90-008 (Mesa / Abilene) / W91-040 [Roazon / Wrangler // Vona / W76-1141 (Nadadores 63 / CO652643 // Centurk)]. The final cross for Agripro Paladin was made in 1992 and the plant selection based upon plant height, fertility and the absence of leaf rust was made in Berthoud, Colorado in 1994. AgriPro Paladin is a medium height semidwarf variety in plant height and has yellow chaff at maturity. It has medium maturity and excellent straw strength. AgriPro Paladin is best adapted to the higher rainfall regions of western Idaho and eastern Washington and irrigated production in the southern Snake River region of Idaho and the Basin of Washington.

Juvenile growth habit is semierect. Coleoptile color is white. Plant color at boot stage is blue green at boot stage. Flag leaf is erect and twisted. Waxy bloom is present on the head, stem and flag leaf sheath. Anther color is yellow. Head shape is tapering, middense and awned. Glumes are glabrous, midwide in width and midlong in length with oblique shoulders and acuminate beaks. Seed shape is ovate. Seed crease depth is shallow and width is narrow. Seed cheeks are rounded.

AgriPro Paladin will be maintained by AgriPro, in Berthoud, Colorado by the head row method. These heads are compared to the morphological characteristics for the variety and any variant rows are discarded. These head rows are then individually harvested and grown as progeny plots. The selected progeny plots are bulked to produce Breeders seed. Generations of AgriPro Paladin, which may be multiplied, will be limited to Breeders seed, Foundation, Registered and Certified.

AgriPro Paladin has been uniform and stable since 2003. Less than 0.8% of the plants were rogued from the Breeder seed increase in 2004. Approximately 90% of the variant plants were taller height wheat plants and approximately 10% were awnletted wheat plants. Up to 0.8% variant plants may be encountered in subsequent generations.

AgriPro maintains seed stock and certified classes of Foundation, Registered and Certified. Certified seed stocks of AgriPro Paladin will be available in the fall of 2006. Certified acreage is not to be published by AOSCA and certifying agencies. Plant Variety Protection is anticipated and AgriPro Paladin may only be sold as a class of certified seed.

KS00F5-14-7 (experimental designation) Hard Red Winter Wheat

KS00F5-14-7 (experimental designation) is a hard red winter wheat developed by the Kansas Agricultural Experiment Station. The name 'Fuller' has been selected and is pending approval from USDA. KS00F5-14-7 was selected from a population with an unknown pedigree. F2 seed was planted in the field for the 1997 crop year at Manhattan, KS. The population was advanced as a bulk to the F4 generation, which was grown at Manhattan, KS in 1999. Individual spikes were pulled from the F4 population and grown as head rows during the 2000 crop year. KS00F5-14-7 was selected as a head row in 2000. In 2001, KS00F5-14-7 was entered in the "short-row" yield trial, a non-replicated test grown at Manhattan and Hutchinson, KS. Based on performance, it was advanced to the "Preliminary yield trials" at Hutchinson and Manhattan in 2002. In 2003, KS00F5-14-7 was tested in the Advanced Yield Trials at six sites across Kansas and was advanced to the Kansas Intrastate Nursery, an elite test grown at 17 locations in Kansas in 2004 and 2005. KS00F5-14-7 has had a significant yield advantage over Jagger (58.6 bu/ac to 52.5 bu/ac) in central Kansas throughout its testing. KS00F5-14-7 also has superior test weight and thousand kernel weight compared to Jagger (see Appendix). KS00F5-14-7 has had longer mixing times and somewhat lower loaf volumes that Jagger in bake tests. Overall, KS00F5-14-7 has acceptable baking quality.

The variety is intended for traditional hard red winter wheat uses. It has performed particularly well in central Kansas, with reasonable, but not exceptional, performance in western Kansas. It is most likely to be grown in central Kansas and adjacent areas of Oklahoma.

KS00F5-14-7 is an early maturing, awned, bronze chaffed hard red winter wheat that is one-half to one day later than Jagger. It is dark green from vegetative through boot stage and is about 2.5 cm taller than Jagger. Variants are limited to: taller plants that occur at a frequency of less than 1 in 10,000. White chaffed plants are also present at a frequency of less than 1 in 1,000. It is also differentiated from Jagger based on reaction to leaf rust. KS00F5-14-7 is highly resistant, while Jagger is fully susceptible to the prevalent races in the Great Plains.

KS00F5-14-7 is resistant to soil-borne mosaic virus, spindle streak mosaic virus, leaf rust, and stripe rust. It is moderately resistant to stem rust and intermediate for tan spot. It is susceptible to Hessian fly.

Seed stock will be maintained via the seed block method by the Kansas Foundation Seed Program, Agronomy Department, Kansas State University, Manhattan, KS. Breeders, foundation, registered and certified seed classes will be used. Foundation seed is planned to be offered for sale in August, 2006. Application for PVP, Title V option is anticipated. Acreage will be published by AOSCA and certifying agencies.

RonL Hard White Winter Wheat

RonL (KS03HW158) is a hard white winter wheat developed by the Kansas Agricultural Experiment Station. It was selected from the cross Trego/CO960293 which was made at Hays, KS in 1999. The pedigree method of breeding was used during its development. RonL is an increase of a F₅ head-row selected in 2003.

It was tested in the Kansas Intra-State Nursery (KIN) over the last two years and preformed best at the western Kansas locations. Its primary area of adaptation is very similar to that of Trego. The milling and baking tests on RonL indicate that it has good baking quality. In 2005 the Wheat Quality Council judged it as being well above average in overall baking quality and not significantly different from the bread quality of Jagger.

RonL is an awned, white chaffed semi-dwarf with a medium late maturity similar to Trego. Its height is also similar to that of Trego. Seed of RonL are white with an ovate shape and medium sized brush. Variants within RonL include tall plants, red chaffed plants, and plants with red seed but none of these occur at a frequency of more than one in 10,000 plants.

RonL carries the temperature sensitive high level of resistance to wheat streak mosaic derived from CO960293. It is also resistant to soilborne mosaic virus and stripe rust. It is susceptible to the current races of leaf rust and Hessian fly.

Seed stocks will be maintained by intensely rogueing foundation production fields and by repurification through head rows at the KSU Agricultural Research Center-Hays. Foundation, Registered, and Certified classes of seed will be recognized. Foundation seed could first be offered for sale in August of 2006. Plant Variety Protection will be applied for and the "Certification Option" elected. The acreage of RonL can be published by AOSCA and certifying agencies.

KS03HW6-6 (experimental designation) Hard White Winter Wheat

KS03HW6-6 is a hard white winter wheat developed by the KSU Agricultural Experiment Station. It was selected from the cross FS2/KS97HW150 //KS97HW349/3/Trego. The final cross was made at Hays, KS in 1998. The pedigree method of breeding was used during its development. KS03HW6-6 is an increase of a F_6 head-row selected in 2003.

KS03HW6-6 has been tested in Kansas replicated yield tests in 2004 and 2005. It is best adapted to western Kansas in the same areas that Trego has been grown. Milling and bread baking quality of KS03HW6-6 has been good. Relative to that of Trego, KS03HW6-6 has stronger mixing properties and more loaf volume than Trego.

KS03HW6-6 is an awned, white chaffed semi-dwarf with a medium late maturity similar to Trego. Its height is also similar to that of Trego. Seed of KS03HW6-6 are white with an ovate shape and medium sized brush. Variants within KS03HW6-6 include tall plants, red chaffed plants, and plants with red seed but none of these occur at a frequency of more than one in 10,000 plants.

KS03HW6-6 contains the BASF owned gene that confers resistance to Beyond herbicide. It also has resistance to the prevalent races of stripe rust in Kansas and soilborne mosaic virus resistance. It is susceptible to current races of leaf rust in Kansas. It is also susceptible to Hessian fly.

Seed stocks will be maintained by intensely rogueing foundation production fields and by repurification through head rows at the KSU Agricultural Research Center-Hays. Foundation, Registered, and Certified classes of seed will be recognized. Foundation seed could first be offered for sale in August of 2006. Plant Variety Protection will be applied for and the "Certification Option" elected. The acreage of KS03HW6-6 can be published by AOSCA and certifying agencies.

25R56 – (XW04A, experimental designation) Soft Red Winter Wheat

25R56 (XW04A, experimental designation) is a soft red winter wheat that was developed by Pioneer Hi-Bred International, Inc. using a modified pedigree selection breeding method. XW04A is primarily intended for grain production and it has shown good adaptation to the northern soft wheat regions based on tests conducted in Arkansas, Kentucky, Missouri, Illinois, Indiana, Ohio, Michigan, Maryland and Ontario, Canada.

The coleoptile color of 25R56 (XW04A, experimental designation) is white and the juvenile growth habit is semi-erect. Leaf color at booting is green and the flag leaf is erect, twisted and has a waxy bloom. Auricle color is white. Anther color is yellow. Spikes of 25R56 (XW04A, experimental designation) are apically awnletted, mid-dense, tapering in shape and nodding at maturity. 25R56 (XW04A, experimental designation) has shown no variants other than what would normally be expected due to environment.

25R56 (XW04A, experimental designation) has shown excellent resistance to stripe rust in the mid-south U.S. region. It also has very good resistance to leaf rust in the northern Corn Belt. It is moderately resistant to the complex of organisms that incite leaf blights including Septoria tritici blotch, Stagnospora nodorum leaf blotch and tan spot. 25R56 (XW04A, experimental designation) has intermediate resistance to the prevalent races of powdery mildew and to wheat spindle streak mosaic virus and to soilborne mosaic virus.

25R56 (XW04A, experimental designation) has shown resistance to Hessian fly biotype L in tests conducted by the USDA-ARS Crop Production and Pest Control Research Unit at Purdue University and it is postulated to have the H9H10 genes for Hessian fly resistance.

The breeder, foundation, and registered seed classes will be maintained and controlled by the Pioneer Parent Wheat Seed headquarters at Mt. Vernon, IN. Foundation seed will be initially produced from breeders seed, and thereafter foundation seed will be produced from foundation seed: maintaining the specific identity and purity of the variety as released by the breeding department. Registered seed will be grown from foundation or breeder seed, and maintained at a purity level satisfactory to Pioneer Parent Seed Operations, Supply Management, or the appropriate certifying agency. Production of certified seed will be controlled by Supply Management, Pioneer Hi-Bred Int'l., Inc. Certified seed of 25R56 (XW04A, experimental designation) will potentially first be offered for sale in the fall of 2006. Application for Plant Variety Protection is anticipated and the certification option will not be chosen. Certified acreage is not to be published by AOSCA and certifying agencies.

26R87 (XW04C, experimental designation) Soft Red Winter Wheat

26R87 (XW04C, experimental designation) is a soft red winter wheat that was developed by Pioneer Hi-Bred International, Inc. using a modified pedigree selection breeding method. 26R87 (XW04C, experimental designation) is primarily intended for grain production and it has shown good adaptation to the soft red winter wheat growing regions of the southeastern and mid-southern U.S. approximately south of the Ohio River.

The coleoptile color of 26R87 (XW04C, experimental designation) is white and the juvenile growth habit is semi-erect. Leaf color at booting is green and the flag leaf is erect, twisted and has a waxy bloom. Auricle color is white. Anther color is yellow. Spikes of 26R87 (XW04C, experimental designation) are awned, mid-dense, oblong in shape and inclined at maturity. 26R87 (XW04C, experimental designation) has shown no variants other than what would normally be expected due to environment.

26R87 (XW04C, experimental designation) has shown excellent resistance to leaf rust and stripe rust in the southern U.S. region. It also has very good resistance to powdery mildew in the region. It has shown moderate resistance to scab, wheat spindle streak mosaic virus, and the complex of organisms that incite leaf blights; including Septoria tritici blotch, Stagnospora nodorum leaf blotch and tan spot. 26R87 (XW04C, experimental designation) is moderately susceptible to soilborne mosaic virus.

26R87 (XW04C, experimental designation) is susceptible to the predominant biotypes of Hessian fly in the southern region.

The breeder, foundation, and registered seed classes will be maintained and controlled by the Pioneer Parent Wheat Seed headquarters at Mt. Vernon, IN and Laurinburg, NC. Foundation seed will be initially produced from breeders seed, and thereafter foundation seed will be produced from foundation seed: maintaining the specific identity and purity of the variety as released by the breeding department. Registered seed will be grown from foundation or breeder seed, and maintained at a purity level satisfactory to Pioneer Parent Seed Operations, Supply Management, or the appropriate certifying agency. Production of certified seed will be controlled by Supply Management, Pioneer Hi-Bred Int'l., Inc. Certified seed of 26R87 (XW04C, experimental designation) will potentially first be offered for sale in the fall of 2006. Application for Plant Variety Protection is anticipated and the certification option will not be chosen. Certified acreage is not to be published by AOSCA and certifying agencies.

Chamberlin Hard Red Spring Wheat

Chamberlin is a hard red spring wheat, bred and developed by WestBred LLC, that is derived from a single F_5 plant selection from the cross of Keystone x Granite. It was advanced and evaluated as a bulk through the F_6 to F_9 generations with an initial F_{10} Breeder Seed Increase in 2005.

Chamberlin is a good standing, early maturing wheat that has good yield potential for high test weight, high protein grain in the hard red spring wheat growing areas of the Northern Great Plains. Chamberlin is resistant to stem rust and moderately resistant to moderately susceptible to leaf rust and foliar disease (tan spot and Septoria tritici). Chamberlin has a moderately susceptible reaction to Fusarium head blight similar to the standard check variety "2375". Quality of Chamberlin is good based on test weight, protein and flour SDS sedimentation values. Chamberlin was developed for the wheat bread flour market.

Chamberlin is an awned, early maturing, semi-dwarf variety with mid-dense, erect, oblong shaped spikes. Awns are mid-long and light tan in color. The flowering glumes are light tan in color, short with square shoulders, and a medium length acuminate beak. The seeds are red and ovate with a medium brush. Chamberlin may contain a tall variant that is 10-20 cm taller than the general population at a frequency of 1 in 10,000.

WestBred LLC will maintain breeder and Foundation seed as needed by growing head row purification increases. The certified classes of seed shall be Foundation, Registered and Certified. Foundation seed will be produced in 2006 and registered seed may be offered for sale in the spring of 2007. Application will be made for protection under the Plant Variety Protection Act and the certification option will not be selected. Acreage of Chamberlin is not to be published by AOSCA and certifying agencies.

Vantage Hard Red Spring Wheat

Vantage (CA-902-704) is a hard red spring wheat, bred and developed by WestBred LLC, that is derived from a single F_5 plant selection from the cross of Keystone x Granite. It was advanced and evaluated as a bulk through the F_6 to F_8 generations with an F_9 Breeder Seed increase in 2005.

Vantage is a good standing, medium-late maturing wheat that can achieve high yield of high test weight and high protein grain in the hard red spring wheat growing areas of the Northern Great Plains. Vantage is resistant to stem rust and moderately resistant to moderately susceptible to leaf rust and foliar disease (tan spot and Septoria tritici). Vantage has a moderately susceptible reaction to Fusarium head blight similar to the check variety "2375". Quality of Vantage is good based on test weight, protein and flour SDS sedimentation values. Vantage was developed for the wheat bread flour market.

Vantage is an awned, medium-late maturing, semi-dwarf variety with mid-dense, erect, oblong shaped spikes. Awns are mid-long and light tan in color. The flowering glumes are light tan in color, short with square shoulders, and medium length acuminate beaks. The seeds are red and ovate with a medium brush. Vantage may contain a tall variant that is 10-20 cm taller than the general population at a frequency of 1 in 10,000.

WestBred LLC will maintain breeder and Foundation seed as needed by growing head row purification increases. The certified classes of seed shall be Foundation, Registered and Certified. Foundation seed will be produced in 2006 and registered seed may be offered for sale in the spring of 2007. Application will be made for protection under the Plant Variety Protection Act and the certification option will not be selected. Acreage of Vantage is not to be published by AOSCA and certifying agencies.

CA904-742 (experimental designation) Hard Red Spring Wheat

CA904-742 is a hard red spring wheat, bred and developed by WestBred LLC, that is derived from a single F_5 plant selection from the cross of Alsen x Keystone. It was advanced and evaluated as a bulk through the F_6 to F_7 generations with an F_8 Breeder Seed increase in 2005.

CA904-742 is a good standing, medium late maturing wheat that has good yield potential for high test weight, high protein grain. It is adapted to the northern half of North Dakota and Minnesota. CA904-742 is resistant to stem rust and moderately resistant to moderately susceptible to leaf rust and foliar diseases (tan spot and Septoria tritici). CA904-742 has a moderately resistant to moderately susceptible reaction to Fusarium head blight in its area of adaptation. It has a reaction similar to the check variety Alsen. Test weight and protein of CA904-742 is good, however, flour SDS sedimentation values are marginal often falling below 100 mm. CA904-742 was developed for the wheat bread flour market.

CA904-742 is an awned, medium late maturing, semi-dwarf variety with mid-dense, erect, oblong shaped spikes. Awns are mid-long and tan in color. The flowering glumes are tan in color, short with oblique shoulders, and medium length acuminate beaks. The seeds are red and oval in shape with a medium brush. CA904-742 may contain a tall variant that is 10-20 cm taller than the general population at a frequency of 1 in 10,000.

WestBred LLC will maintain breeder and Foundation seed as needed by growing head row purification increases. The certified classes of seed shall be Foundation, Registered and Certified. Foundation seed will be produced in 2006 and registered seed may be offered for sale in the spring of 2007. Application will be made for protection under the Plant Variety Protection Act and the certification option will not be selected. Acreage of CA904-742 is not to be published by AOSCA and certifying agencies.

CA904-743 (experimental designation) Hard Red Spring Wheat

CA904-743 is a hard red spring wheat, bred and developed by WestBred LLC, that is derived from a single F_5 plant selection from the cross of Keystone x Granite. It was advanced and evaluated as a bulk through the F_6 to F_8 generations with an initial F_9 Breeder Seed increase in 2005.

CA904-743 is a good standing, medium-early maturing wheat with good yield potential of good test weight and moderate protein grain and is adapted to the hard red spring wheat growing areas of the Northern Great Plains. CA904-743 is resistant to stem rust but susceptible to leaf rust. It is moderately susceptible to foliar diseases (tan spot and Septoria tritici). CA904-743 has a moderately susceptible reaction to Fusarium head blight similar to the check variety "2375". Quality of CA904-743 is good based on test weight, protein and flour SDS sedimentation values. CA-04-743 was developed for the wheat bread flour market.

CA904-743 is an awned, medium-early maturing, semi-dwarf variety with mid-dense, inclined, oblong shaped spikes. Awns are mid-long and light tan in color. The flowering glumes are light tan in color, short with oblique shoulders, and medium length, acuminate beaks. The seeds are red and ovate in shape with a medium brush. CA904-743 may contain a tall variant that is 10-20 cm taller than the general population at a frequency of 1 in 10,000.

WestBred LLC will maintain breeder and Foundation seed as needed by growing head row purification increases. The certified classes of seed shall be Foundation, Registered and Certified. Foundation seed will be produced in 2006 and registered seed may be offered for sale in the spring of 2007. Application will be made for protection under the Plant Variety Protection Act and the certification option will not be selected. Acreage of CA904-743 is not to be published by AOSCA and certifying agencies.

CA905-751 (experimental designation) Hard Red Spring Wheat

CA905-751 is a hard red spring wheat, bred and developed by WestBred LLC, that is derived from a single F_5 plant selection from the cross of Express x Knudson. It was advanced and evaluated as a bulk through the F_6 to F_7 generations with an initial F_8 Breeder Seed increase in 2005.

CA905-751 is a good standing, late maturing hard red spring wheat that has good yield potential for medium test weight and medium high protein grain in the northern half of the Red River Valley and northwestern Minnesota. Preliminary observations indicate that it is resistant to stem rust, moderately resistant to leaf rust, and moderately resistant to moderately susceptible to foliar diseases (tan spot and Septoria tritici). CA905-751 has a moderately susceptible reaction to Fusarium head blight. Quality of CA905-751 is good based on test weight, protein and flour SDS sedimentation values. CA905-751 was developed for the wheat bread flour market.

CA905-751 is an awned, late maturing, semi-dwarf variety with mid-dense, inclined, oblong shaped spikes. Awns are mid-long and tan in color. The flowering glumes are tan in color, mid-long with rounded shoulders, and medium length, acuminate beaks. The seeds are red and ovate in shape with a large brush. CA905-751 may contain a tall variant that is 10-20 cm taller than the general population at a frequency of 1 in 10,000.

WestBred LLC will maintain breeder and Foundation seed as needed by growing head row purification increases. The certified classes of seed shall be Foundation, Registered and Certified. Foundation seed will be produced in 2006 and registered seed may be offered for sale in the spring of 2007. Application will be made for protection under the Plant Variety Protection Act and the certification option will not be selected. Acreage of CA905-751 is not to be published by AOSCA and certifying agencies.

Samson Hard Red Spring Wheat

Samson is a hard red spring wheat, bred and developed by WestBred LLC, that is derived from a single F_5 plant selection from the cross of Express x Knudson. It was advanced and evaluated as a bulk through the F_6 to F_7 generations with an initial F_8 Breeder Seed increase in 2005.

Samson is a medium maturing hard red spring wheat that can achieve high yield of medium test weight and medium high protein grain in the northern half of the Red River Valley and northwestern Minnesota. Preliminary observations indicate that it is resistant to stem rust, moderately resistant to leaf rust and foliar diseases (tan spot and Septoria tritici). Samson has a moderately susceptible to susceptible reaction to Fusarium head blight and stripe rust. Quality of Samson is good based on test weight, protein and flour SDS sedimentation values. Samson was developed for the wheat bread flour market.

Samson is an awned, medium maturing, semi-dwarf variety with mid-dense, inclined, oblong shaped spikes. Awns are mid-long and light tan in color. The flowering glumes are light tan in color, mid-long with oblique shoulders, and medium length, acuminate beaks. The seeds are red and ovate in shape with a large brush. Samson may contain a tall variant that is 10-20 cm taller than the general population at a frequency of 1 in 10,000.

WestBred LLC will maintain breeder and Foundation seed as needed by growing head row purification increases. The certified classes of seed shall be Foundation, Registered and Certified. Foundation seed will be produced in 2006 and registered seed may be offered for sale in the spring of 2007. Application will be made for protection under the Plant Variety Protection Act and the certification option will not be selected. Acreage of Samson is not to be published by AOSCA and certifying agencies.

CA903-724 (experimental designation) Hard Red Spring Wheat

CA903-724 is a hard red spring wheat, bred and developed by WestBred LLC, that is derived from a single F_4 plant selection from the cross of Express x Verde. It was advanced and evaluated as a bulk through the F_5 to F_7 generations with an initial F_8 Breeder Seed increase in the winter of 2004-2005.

CA903-724 is a good standing, early maturing wheat variety that has good yield potential for high test weight and medium protein grain. It is adapted to the hard red spring wheat growing regions of North Dakota and Minnesota. CA903-724 is resistant to stem rust and moderately resistant to moderately susceptible to leaf rust and foliar diseases (tan spot and Septoria tritici). CA903-724 has a moderately susceptible to susceptible reaction to Fusarium head blight. Quality of CA903-724 is good based on test weight, protein and flour SDS sedimentation values. CA903-724 was developed for the wheat bread flour market.

CA903-724 is an awned, early maturing, semi-dwarf variety with mid-dense, inclined, oblong shaped spikes. Awns are mid-long and white/amber in color. The flowering glumes are white/amber in color, mid-long with rounded shoulders, and medium length acuminate beaks. The seeds are red and ovate with a medium brush. CA903-724 may contain a tall variant that is 10-20 cm taller than the general population at a frequency of 1 in 10,000.

WestBred LLC will maintain breeder and Foundation seed as needed by growing head row purification increases. The certified classes of seed shall be Foundation, Registered and Certified. Foundation seed will be produced in 2006 and registered seed may be offered for sale in the spring of 2007. Application will be made for protection under the Plant Variety Protection Act and the certification option will not be selected. Acreage of CA903-724 is not to be published by AOSCA and certifying agencies.

Shavano Hard White Winter Wheat

Shavano is a hard white winter wheat variety developed by WestBred LLC and tested as HV9W98-926W.

Shavano was derived from the bulk population 95CGT-96WD, which was composed of a bulk of multiple red x white seeded F2 populations in 1994 and run over a gravity table for two consecutive years to generate a heavier seeded population segregating for white seeded types. Individual head selections were made in 1996, followed by traditional pedigree breeding methodology. A single F8 head row was harvested in 2000. Breeder seed was produced in 2004.

Performance of Shavano has been good region wide. It is, however, best adapted to the western high plains of the hard red winter wheat region for the purpose of grain production due to susceptibility to head sprout.

Shavano has a white coleoptile, semi-erect juvenile growth habit, and green leaf color at boot stage. The flag leaf is erect, twisted, and has no waxy bloom. The auricle color is white. The stem color is white. The internodes are hollow, and the anthers are yellow. The spike shape is tapering, mid-dense and inclined at maturity. Shavano has mid-long awns which are tan at maturity. The glumes are white/amber at maturity, glabrous, mid-long, with rounded shoulders, and medium length, acuminate beaks. The seed is white and ovate, with a medium brush. The phenol reaction is black.

Variants which may occur include slightly taller (5-10 cm) at a rate of 0.4%, bronze chaffed plants at a rate of 0.1%, and red seed at a rate of 0.8%.

Shavano is resistant to soil borne mosaic virus and spindle streak mosaic virus. It is moderately susceptible to barley yellow dwarf virus, and moderately resistant to glume blotch. It is susceptible to Hessian Fly and moderately resistant to the current races of leaf rust. Shavano is moderately resistant to powdery mildew and speckled leaf blotch. It is susceptible to stripe rust. It is moderately resistant to tan spot. Shavano is moderately susceptible to wheat streak mosaic virus, and is moderately resistant to acid soil conditions. It is medium maturity, about 3 days earlier than Trego, and medium height, about 2 inches taller than Trego.

Shavano has a medium length coleoptile, very good shatter resistance, and good straw strength. The milling and baking quality is very good

Seedstocks of Shavano will be maintained and increased by WestBred LLC by increasing remnant breeder seed. As needed, heads selections will be made from the breeder seed increase to renew and purify the seed.

Certified seed sales are anticipated fall of 2006.

Plant variety protection will not be applied for. Acreages may be published by AOSCA and certifying agencies.

Keota Hard Red Winter Wheat

Keota is a hard red winter wheat developed by WestBred LLC, and tested as HV9W98-143R. Keota was derived from the cross OK88767-11/Jagger made in 1994. Traditional pedigree methodology was used, resulting in the selection of an F7 head-row in 2001. Breeder Seed was produced in 2004.

Keota is adapted throughout the southern Great Plains, but will be best utilized in the western high plains region for the purpose of grain production.

Keota has a white coleoptile and semi-erect juvenile growth habit. The leaf color at boot stage is green. The flag leaf is erect, twisted, and has waxy bloom. The auricle is white. Keota is medium maturity and medium-tall height. Its stem is white. The stems are hollow, and anthers are yellow. The spike at maturity is tapering, mid-dense, and erect. Keota has mid-long awns which are yellow at maturity. The glumes are white/amber, mid-long, and have a square shoulder. The beak is acuminate, and medium length. The glumes are glabrous. The seed is red, ovate, and with a small brush. The phenol reaction is black.

Variants which may occur include bronze chaffed plants at a rate of .01%, and slightly shorter plants at a rate of 0.1%, along with a longer, more lax headed type at a rate of .01%.

Keota is moderately susceptible to barley yellow dwarf and glume blotch. It is susceptible to Hessian Fly, leaf rust, and powdery mildew. It is moderately susceptible to speckled leaf blotch. Keota is resistant to soil borne mosaic virus and spindle streak mosaic virus, and moderately susceptible to stem rust. It is moderately resistant to current races of stripe rust. Keota is moderately susceptible to tan spot, and moderately resistant to wheat streak mosaic virus. It is moderately resistant to acid soil conditions.

Keota has a medium long coleoptile, with above average straw strength and good shattering resistance. Keota has acceptable milling and baking quality.

Remnant breeder seed will be utilized to reproduce the variety as needed. If necessary, 300 heads will be selected from the breeder seed increase and grown under irrigation in Colorado to renew the breeder seed and maintain purity. Seed classes to be recognized include Foundation, Registered, and Certified. We anticipate certified seed sales in fall 2006. Plant Variety Protection will be applied for. The certification option will not be elected. AOSCA and seed certifying agencies may publish acreages.

Tarkio Hard Red Winter Wheat

Tarkio is a hard red winter wheat variety developed by WestBred LLC of Haven, Kansas. Tarkio originated from the cross OK90604/KSSB-369-7//Snow White made in 1995, and advanced by traditional pedigree breeding methodology. Tarkio was derived from an F7 purification headrow. The F8 was bulked to provide seed for breeder seed production in 2004.

Tarkio is best adapted to north central and northeastern Kansas for grain production. Due to a lower test weight pattern and marginally acceptable quality, Tarkio will be used almost exclusively in variety blends.

Tarkio has a white coleoptile color, is semi-erect during juvenile growth, with green leaves at boot stage. Tarkio is medium-early maturity, and medium height. The flag leaf is erect, twisted, with waxy bloom present. The auricle color is white. The anther color is yellow. The stem color is white, with hollow internodes. The spike is tapering, dense, and inclined at maturity. Tarkio has mid-long awns which are white/amber at maturity. The glume color at maturity is white/amber. Glumes are mid-long with square shoulders, and medium length, acuminate beaks. The glumes have a very slight pubescence. The seed is red and ovate, with a large brush. The phenol reaction is black brown.

Variants which may occur include slightly taller plants at a rate of 0.02%, and bronze chaffed plants at a rate of 0.1%.

Tarkio is moderately susceptible to barley yellow dwarf virus, moderately resistant to glume blotch, susceptible to leaf rust, resistant to powdery mildew, moderately resistant to stripe rust, moderately resistant to speckled leaf blotch, resistant to soil borne mosaic virus, resistant to spindle streak mosaic virus, moderately resistant to current races of stem rust, moderately resistant to tan spot, moderately susceptible to wheat streak mosaic, and moderately resistant to aluminum toxicity. Tarkio is susceptible to Hessian Fly and Russian Wheat Aphid. It has a medium length coleoptile, and has good shatter resistance. The straw strength is good. The quality of Tarkio is marginally acceptable.

Remnant breeder seed will be utilized to reproduce the variety as needed. If necessary, 300 heads will be selected from the breeder seed increase and grown under irrigation in Colorado to renew the breeder seed and maintain purity. Seed classes to be recognized include Foundation, Registered, and Certified. We anticipate certified seed sales in fall 2006. Plant Variety Protection will not be applied for. AOSCA and seed certifying agencies may publish acreages.

Shocker Hard Red Winter Wheat

Shocker is a hard red winter wheat developed by WestBred LLC, and tested as HV9W99-558R. It was derived from the cross Freedom/Tomahawk//Jagger made in 1995, and selected from an F7 head-row produced by traditional pedigree breeding methodology. Breeder Seed was produced in 2005.

Shocker is best adapted to the southern half of the hard winter wheat growing region of the Great Plains, including Kansas, Oklahoma, and Texas for the purpose of grain production.

The coleoptile color is white. The juvenile growth habit is erect. The leaf color at boot stage is green. The flag leaf is erect, twisted, and with no waxy bloom. The auricle is white. The stem is white at maturity, with hollow internodes. The anthers are yellow. The spike is tapering, middense, and inclined at maturity. WestBred Shocker has mid-long awns which are tan at maturity. The glumes are glabrous, white/amber at maturity, mid-long, have square shoulders, and acuminate beaks which are medium length. The seed is red and oval, with a large brush. The phenol reaction is black brown.

Variants which may occur include 0.2% bronze/brown chaffed plants, and 0.1% slightly taller plants.

WestBred Shocker is moderately susceptible to barley yellow dwarf, moderately resistant to glume blotch, susceptible to Hessian Fly, and resistant to current races of leaf rust. It is moderately susceptible to powdery mildew, and moderately resistant to speckled leaf blotch. It is resistant to soil borne mosaic virus and spindle streak mosaic virus. It is moderately resistant to stripe rust and tan spot.

Shocker has very good straw strength and test weight, and good shattering resistance. Shocker is early maturing and medium height. The milling and baking quality is acceptable.

Remnant breeder seed will be utilized to reproduce the variety as needed. If necessary, 300 heads will be selected from the breeder seed increase and grown under irrigation in Colorado to renew the breeder seed and maintain purity. Seed classes to be recognized include Foundation, Registered, and Certified. We anticipate certified seed sales in fall 2006. Plant Variety Protection will be applied for. The certification option will not be elected. AOSCA and seed certifying agencies may publish acreages.

Smoky Hill Hard Red Winter Wheat

Smoky Hill is a hard red winter wheat developed and owned by WestBred LLC. It was derived from a population designated "97K 8/64 Masa 3" and tested as HV9W99-1324R. "97K 8/64 Masa 3" was a population created by bulking the harvested F2 plots of 4 different populations, each with GSR2500 as a parent. Individual heads were selected from the resulting F3 population in 1997, followed by traditional pedigree breeding methodology. Several selected F8 head rows were bulked to produce the line in 2002. Breeder seed was produced in 2005.

Smoky Hill is best adapted to the northern tier of Kansas and northeast Colorado roughly above I-70 for the purpose of grain production.

Smoky Hill has a white coleoptile and prostrate juvenile growth habit. The leaf color is green, and the flag leaf is erect, twisted, with no waxy bloom present. The auricle color is purple. The stems are white and have hollow internodes. The anthers are yellow. The spike is tapering, mid-dense, and inclined at maturity. Smoky Hill has mid-long awns which are tan at maturity. The glumes are glabrous, brown and mid-long, with square shoulders and acuminate, medium length beaks. The seed is red and ovate with a medium size brush. The phenol reaction is black brown.

Variants which may occur include taller plants at a rate of 0.1% and white chaffed plants at a rate of 0.3%.

Smoky Hill is moderately susceptible to barley yellow dwarf virus, and moderately resistant to glume blotch. It is susceptible to Hessian Fly. It is resistant to current races of leaf rust in the southern Great Plains. It is moderately susceptible to powdery mildew, and moderately resistant to speckled leaf blotch. It is resistant to soil borne mosaic virus and spindle streak mosaic virus. Smoky Hill is moderately resistant to current races of stripe rust, and is also moderately resistant to tan spot.

Smoky Hill has a medium coleoptile length, is medium height, and is medium late maturity. It has good shattering resistance and good straw strength. The test weight is good. Winterhardiness is very good. The protein, milling, and baking quality of Smoky Hill are very good.

Remnant breeder seed will be utilized to reproduce the variety as needed. If necessary, 300 heads will be selected from the breeder seed increase and grown under irrigation in Colorado to renew the breeder seed and maintain purity. Seed classes to be recognized include Foundation, Registered, and Certified. We anticipate certified seed sales in fall 2006. Plant Variety Protection will be applied for. The certification option will not be elected. AOSCA and seed certifying agencies may publish acreages.

Solano Hard Red Spring Wheat

Solano (Experimental designation DA900-229) is a hard red spring wheat variety developed by Westbred, LLC. Solano originated from the cross DA993-191/Express using a modified pedigree breeding system. Solano has been tested in and is adapted to the irrigated areas of the Sacramento Valley and Delta areas of California. It has acceptable milling quality, good mixing characteristics and good baking quality. The quality is equal to the variety Express.

Solano is a day length insensitive spring wheat. The average height is 89 cm which is 8 cm shorter than Express. Solano has green leaves at the boot stage. The flag leaf is erect, twisted with waxy bloom. The auricles are white. Stems are white, hollow, with pubescence present on the last rachis internode. The spike is awned, lax, and white with an oblong shape. The awns are white and midlong. The spikes are inclined at maturity. The glumes are white, long, midwide and have elevated shoulders. The beaks are mid-wide, medium long and acuminate. Solano has long midwide and elliptical seed. The brushes are large, medium long and are not collared. The seed crease is shallow and narrow. The cheeks are rounded and the germ is midsize. Solano most resembles Express but differs in that Solano has elevated glume shoulders while Express has oblique glume shoulders. Solano has green leaves at booting while Express has blue-green leaves.

Solano has a tall variant that is 12 cm to 24 cm taller which occurs at a frequency of up to 0.1%. A white-seed variant occurs at a frequency of up to 0.1%. An awnless variant occurs at a frequency of up to 0.1%.

Solano was tolerant to the prevalent races of stripe rust found in California until 2004 but is now susceptible to at least one of the new races in 2005. Solano is tolerant to Septoria tritici. No data has been collected on insect susceptibility. Westbred, LLC will maintain breeder seed by planting spike rows as needed. The certified seed classes will be Foundation, Registered and Certified. Certified seed will be available in the fall of 2006. Certified acreage is not to be published by AOSCA and certifying agencies. Application for Plant Variety Protection will be made in 2006 and the "Certification Option" will not be elected.

Joaquin Hard Red Wheat

Joaquin (Experimental designationYU999-178) is a hard red wheat that originated from a cross made by Westbred, LLC with a pedigree of Eldon/PH994-199. The breeding method used was selected single-spike bulk modified pedigree. Joaquin is adapted to the irrigated areas of the San Joaquin Valley in California. It has acceptable milling, mixing and baking characteristics. The quality is equal to Blanca Grande.

Joaquin is a day-length insensitive spring wheat. The average height is 88 centimeters which is 11 centimeters taller than Yecora Rojo. Joaquin has green leaves at boot stage. The flag leaf is erect and twisted with waxy bloom. The auricles are white. The stems are white and hollow. Joaquin has a lax, tapering spike that is inclined at maturity. The awns are white. The white glumes are long with elevated shoulders. The glume beaks are medium long and acuminate. The seeds are oval shaped with medium size brushes. Joaquin has a tall variant that is 12 cm to 24 cm taller that occurs at a frequency of up to .2%. A white seed variant occurs at a frequency of up to .2%.

Joaquin was tolerant to the most prevalent stripe rust races found in California until 2004 but now is moderately susceptible to at least one of the new races in 2005. Joaquin is susceptible to Septoria tritici and thus is not recommended for the Sacramento Valley. No data has been collected on insect susceptibility.

Westbred, LLC will maintain breeder seed by planting spike rows as needed. The certified classes of seed will be Foundation, Registered and Certified. Certified seed will be available in the fall of 2006. Certified acreage is not to be published by AOSCA and certifying agencies. Application for Plant Variety Protection will be made in 2006 and the "Certification Option" will not be elected.

Baker Spring Oats

The variety Baker has been documented to produce high yield and groat percentage in Iowa. Its likely area of adaptation will be the southern regions of spring oat production. Locations where Baker consistently excelled (from west to east) were Beresford and Watertown, SD; Ames, IA; Morris, MN; and Urbana, IL. Areas where Baker excelled in one year were Rosemount, MN; W. Lafayette, IN; E. Lansing, MI; and Ithaca, NY. These data show that Baker can excel across the southern regions for spring oat production. Areas of definite adaptation are from eastern South Dakota, Iowa and areas of Minnesota and Illinois. Further testing will be necessary to determine how competitive it is with other released varieties in other areas. In Iowa, the variety has high yield and groat percentage, making it valuable for both on-farm use and processing.

Baker is a mid-season oat, maturing at a date similar to Ogle, Jerry, and Blaze. It displays an erect growth habit in its tillers and flag leaf. At maturity, it has yellow, medium diameter stems, with pubescence at the nodes. Its panicles are mid-long, broad, and equilateral, with dropping main branches. Its seed are white, slender, and non-fluorescent. Recurring variants with Baker have not been observed.

Baker's disease resistance are similar to those of other current spring oat varieties. Baker's resistance to insects has not been evaluated.

Foundation seed will be maintained by the Iowa State University Committee for Agricultural Development. Other seed classes to be used are Certified and Registered.

Foundation seed will be offered for sale to seed companies in 2006. Certified seed will first be offered for sale to farmers in 2007.

Application will not be made for protection under PVP.

Amended Description Santa Fe Hard Red Winter Wheat

Santa Fe is a hard red winter wheat variety developed by WestBred LLC of Haven Kansas, and tested as experimental G980039. Santa Fe originated from the cross G1878 x Jagger made in 1993, and was selected through traditional pedigree breeding methods. Breeders seed was derived from the bulk of 50 F8 head-rows harvested in 2001. Santa Fe is well adapted to the southern Great Plains for grain production.

Santa Fe has semi-erect juvenile growth habit and green leaf color at boot stage. The flag leaf is erect, twisted, and has no waxy bloom. The auricle color is white. Santa Fe has a heading date 1 day later than Jagger. The anthers are yellow, and the internodes are hollow. The stem color at maturity is white. Plant height averages 2.5 cm shorter than Jagger. The spike shape is tapering, the density is mid-dense, and the position at maturity is inclined. Santa Fe is awned, with mid-long, brown awns. At maturity, the glumes are long, with elevated shoulders. The glume color is tan with a gray brown upper half. The glume beaks are medium length and acuminate. The seed is red, ovate, and has a medium size brush. The phenol reaction is black brown.

Variants which may occur, include later maturing plants at a rate of 0.2%, taller plants at a rate of 0.1%, and shorter, white chaffed plants at a rate of 0.2%. White seed may occur at a rate of 0.2%.

Santa Fe is moderately resistant to the current races of leaf rust prevalent in the southern plains, and resistant to the current race of stripe rust. It is resistant to soil borne mosaic virus, moderately resistant to septoria, and moderately resistant to tan spot. It is susceptible to powdery mildew, greenbug, Hessian fly, and Russian wheat aphid.

The milling and baking quality of Santa Fe is acceptable.

300 heads have been retained from breeder's seed plots, which will be used to re-constitute the variety under irrigation in Colorado and maintain a pure seed source. This cycle will be repeated as needed. Seed classes to be recognized include Foundation, Registered, and Certified.

We anticipate certified seed sales in August, 2005.

Application for protection through the Plant Variety Protection Act will be made. The Certification Option will be elected.

Acreages may be published by AOSCA and certifying agencies.